FOR FREE WIRELESS COURSE, SEE PAGE 200

'EVERYTHING FOR THE EXPERIMENTER'

CATALOG Nº 12

1st Edition
1914

THE ELECTRO IMPORTING CO.

DOWNTOWN RETAIL STORE: 69 WEST BROADWAY, NEW YORK

Orders Filled From Our Store — City patrons will please call at our store, NOT at 233 Fulton Street

FOR PARCEL POST AND SHIPPING WEIGHTS, SEE PAGE 187

WHEREAS, the Electro Importing Company is a manufacturing orporation, incorporated to do business in the State of New ork, and

WHEREAS, Hugo Gernsback is the President thereof, now therefore, I, Hugo Gernsback of New York City, New York, being duly worn depose and say that:

WHEREAS, each and every testimonial published at the foot of ch page of this catalog is unsolicited, that these testimonials ave been received from bona fida customers, that their names and resses are genuine as published, that the testimonials are unltered and undoctored, and,

WHEREAS, the testimonials as published have been taken at ives rotedom from the testimonial files of the Electro Importing Company, and that they represent only a small percentage of the total umber of these letters in the possession of the Company, now herefore:

It is agreed that the Electro Importing Company will pay the um of $100.00 to anyone who will prove that the above facts are ot true and correct as affirmed.

Hugo Gernsback

Sworn to before me this 29 day of October 1912

T.D.CAT 1914
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IF YOU DON'T KNOW US—THIS WILL TELL YOU

The Electro Importing Co. was born in 1904 at No. 32 Park Place, New York, in a little office 10 feet square. At that time we were the only and original concern in America selling solely experimental electrical goods.

The first amateur wireless outfit in America was made and sold by us, and the writer, the pioneer in Amateur Wireless, is not without good reasons called: **"The Father of Amateur Wireless"** by his friends and followers.

We grew rapidly—not because we had the goods to sell, but because we gave everybody a square deal, and in 1905 we moved to larger quarters at 87 Warren Street, where we had better manufacturing facilities.

Early in 1908 we again had outgrown our facilities and moved to 80-82-84-86 West Broadway, with six times as much floor space as before.

These quarters in less than one year proved inadequate, and as we were cramped for office and factory space, we opened a retail store at 69 West Broadway in 1909, where we could take better care of our local trade and at the same time give better service to our many city customers. This store to-day is the Mecca of all local Wireless "fiends" as well as visitors. In its kind it is the most unique store in New York.

In 1910, when conditions became intolerable, when every inch of floor, wall, and even ceiling space was at a premium, we looked around for a new home and moved to our own 5-story building at No. 233 Fulton Street, which we now occupy from basement to roof.

Although we have here over 15,000 square feet at our disposal we again became cramped in 1912, and we had to take the building next door to us, thus almost doubling our floor space.

It must be plain to anyone that there must be a good reason for such a growth. There is no secret about it. The answer is: **ENORMOUS VALUE FOR THE MONEY, AND THE FAMOUS E. I. CO. SQUARE DEAL.**

This means that your dollar will go twice as far when spent with us than with any other electrical house in the U. S. Also, as every 400th magazine knows, the **E. I. CO. ALWAYS MAKES GOOD.** That's the key of our success.

Our mail in 1912 averaged above 900 pieces of mail daily. We receive and ship 300 orders each day. We control more patents on experimental and Wireless apparatus than any other concern in America. We manufacture and handle more such material than any other of our competitors.

We buy our raw material by the ton and carload, where our competitors buy in pound lots. Do you wonder that our prices are from 25 to 50 per cent. lower, and that we give you superior goods on top of it?

Our trademark: **"Everything for the Experimenter"** is not an idle phrase. Ninety per cent. of our customers are experimenters, and our international reputation as **"THE electrical mail order house"** is well founded. There is not a civilized country on the globe where our instruments are not known.

We realize more than anybody else that the average experimenter's pocketbook is not overfed, and our prices are accordingly. We could easily get twice the amount for some of the articles, but our policy has always been to make a very small profit on a large amount of sales, thereby invariably giving the customer the benefit.

In closing let us add a word to the wise. If you pay more for articles such as we list, **YOU ARE GETTING ROBBED.** If you are buying less, you will unfailingly **PAY MORE,** for you are positively getting inferior material, which you must replace later.

WE DO NOT SELL GOLD BRICKS, WE CANNOT AFFORD IT.

THE ELECTRO IMPORTING CO.,

H. GERNSBACK, PRESIDENT.

TREATISE ON WIRELESS TELEGRAPHY

By H. GERNSBACK

President ELECTRO IMPORTING CO.
Editor "THE ELECTRICAL EXPERIMENTER"

WIRELESS AND THE AMATEUR
A RETROSPECT

PART ONE

ON December 13, 1912, the new wireless law went into effect. The average wir "fiend," who has not followed the topic from the start will be interested in following facts:

The very first talk about Wireless Legislation in the country started in The writer in his Editorial in the November, 1908 issue of **Modern Electrics** poi that a wireless law was sure to be passed in a very short while. In order to guar unfair legislation as far as the wireless amateur was concerned the writer, in 1909, organized the "Wireless Association of America." This was done to br wireless amateurs together and to protest against unfair laws. Previous to this tim was no wireless club or association in the country. In January, 1913 there were o clubs in existence, all of which owe their origin to the "Wireless Association of An

The association had no sooner become a national body than the first wireless bil its appearance. It was the famous Roberts Bill, put up by the since defunct w "trust." The writer single handedly, fought this bill, tooth and nail. He had repr in Washington, and was the direct cause of having some 8,000 wireless amateur from sting letters and telegrams to their congressmen in Washington. The writer's E which inspired the thousands of amateurs, appeared in the January, 1910, i **Modern Electrics. It was the only Editorial during this time that fought the Robert** No other electrical periodical seemed to care a whoop whether the amateur sho muzzled or not. If the Roberts Bill had become a law there would be no wireless an to-day.

That editorial quickly found its way into the press and hundreds of newspape dorsed the writer's stand. During January, 1910, the **New York American,** the **New Independent,** the **New York World,** the **New York Times,** the **Boston Transcript,** et lauded and commended the writer's views. (See Editorial article February, 1910, **M Electrics.)** Public sentiment quickly turned against the Roberts Bill and it was dr

The first wireless bill not antagonistic to the amateur, The Burke Bill, appear March 8, 1910. It had some defects, however, and was dropped also.

The Depew Wireless Bill appeared May 6, 1910, but did not meet with genera proval; as the writer pointed out in his Editorial in the June, 1910, issue of **M Electrics,** it had several undesirable features, and the bill was never seriously cons although it actually passed the Senate. (See Editorial, August, 1910, **Modern El**

At last the Alexander Bill made its appearance on December 11, 1911. This far as the amateur was concerned was not quite acceptable to the writer, who h amateurs' rights at heart, and steps were immediately taken to bring about an a as the writer, perhaps, more than anyone else, realized that this bill, in som other, would become a law sooner or later. This is clearly stated in his Edit February, 1912, issue of **Modern Electrics. In that Editorial is to be found a**

now historical recommendation that if a wireless law was to be framed it should strict the amateur from using a higher power than 1 kw. and his wave length should be ppt below 200 metres. No one else had thought of this before, and it is to be noted that hen Congress finally passed the present wireless law, **it accepted the writer's recommendation in full,** thus paying him the greatest compliment, while at the same time acknowledging the fact that he acted as the then **sole** spokesman for and in behalf of the wireless amateur.

In March, 1912, the writer, in a letter to the **New York Times** (See page 24, April, 1912, issue **Modern Electrics**) pointed out the shortcomings of the Alexander Bill, and protested against unfair legislation.

The Times, as well as a host of other newspapers, took up the cry and published broadcast the shortcomings of the Alexander Bill.

All this agitation had the desired effect and Mr. Alexander for the first time realized hat the amateur could not be muzzled, especially when there was such a periodical as **odern Electrics** to champion his cause. Promptly in April the Alexander Wireless Bill, **amended,** appeared and here for the first time in history the amateur and his rights are troduced in any wireless bill.

Mr. Alexander and his advisers accepted the writer's recommendations as set forth in Editorial in the February, 1912, issue of **Modern Electrics.** (See Paragraph 15, 2nd Part this Treatise.)

It will be noted that it copied the writer's recommendation word for word.

The amateur had at last come into his own. This is all the more remarkable as this e only country that recognizes the wireless amateur.

On May 7, 1912, the Alexander Bill, amended, now known as S-6412, passed the ed States Senate and on May 8th was sent to the House of Representatives and rred to the Committee on the Merchant Marine and Fisheries.

The bill was signed on August 13th by President Taft, thus making it a law.

This terminated the fight which the writer had waged single-handedly for almost five rs in behalf of the American amateur.

Now that it is all over, and that Uncle Sam has set his seal of approval upon the teur's wireless, the writer cannot but extend his heartiest congratulations to the 400,000 erican amateurs; and he furthermore wishes to extend his thanks to all the amateurs have supported him in his fight to bring about a new wireless era in America.

Long live the Wireless! Long live the Amateur!!

WIRELESS AND THE LAYMAN

PART TWO.

HE question we hear from most beginners is:—"What outfit do you advise me to use? I know nothing about wireless."

We advise the use of ANY of our receiving outfits. They are ALL good—the result of 9 years manufacturing. Which one to choose depends upon yourself, your taste and your pocketbook. This is where YOU must decide. Of course, ALL our outfits ork, they are all guaranteed to do so—OR MONEY BACK. The lower priced outfits have turally a short range—they won't catch messages hundreds of miles away, and those without tuning coils can be used to "cut out" one of the messages when two them are in the "air" at the same time. It is self-nt though, that you can start with the very cheapest —say anyone of our detectors and a pony telephone receiver. With such an outfit messages can be picked up astonishingly well indeed. Many of our enthusiastic young friends started with such an outfit and kept on adding instruments till they finally had up-to-date stations.

Receiving Wireless Messages

The next question hurled at us is:—"How can I receive messages if I don't kn codes?"

A wireless telegram, no matter if it is in Chinese or English, "comes in" i and dashes. When you have the telephone receivers to your ear and a message is in, you hear a series of long and short, clear, distinct buzzes. A long buzz is a d short buzz is a dot. We sell a 10c code chart by means of which the dots and are translated into letters. Thus (in the Morse code), dash, dash, dot, stands f letter G; dash, dash means M, dash, dot, dash, dot means J and so forth. Any perso a few weeks' practice "listening to the wireless" can master the code, and rea messages with ease.

Remember that there are over two thousand high powered wireless stations i country alone, each being able to transmit messages of over a thousand miles dis

There are almost at any minute, during night and day, messages in the air, no where you are,—sending YOU messages, only waiting to be picked up by you. It is wonderful; it is the cheapest as well as the most elevating diversion known to m man, the most inspiring example of the triumph of mind over matter.

"How about the Wireless Law?", you want to know next.

The law does not apply for stations used for **receiving** only. **There is no law forbids you to receive all the messages you wish.** You can receive as many and as lo you please,—Uncle Sam doesn't mind. But you MUST preserve the secrecy of the sage. You must not make use of any information you receive by wireless, if this mation is of such a nature that makes it private property. Your own conscience tell you which message to keep secret and which one you can make use of. Here text of the Law:

SECRECY OF MESSAGES

"Nineteenth. No person or persons engaged in or having knowledge of the oper of any station or stations, shall divulge or publish the contents of any messages t mitted or received by such station, except to the person or persons to whom the same be directed, or their authorized agent, or to another station employed to forward message to its destination, unless legally required to do so by the court of competent diction or other competent authority. Any person guilty of divulging or publishing message, except as herein provided, shall, on conviction thereof, be punishable by a of not more than two hundred and fifty dollars or imprisonment for a period of no ceeding three months, or both fine and imprisonment in the discretion of the court."

Of late a great many stations are beginning to use the wireless telephone. art is rapidly being perfected and is the coming thing in "Wireless." There is h a week that you do not read about some new wireless tele and some new distance record established.

Wireless Telephony

It is of course understood that any receiving apparatus can receive wireless telegraph messages, 90 times out of can receive wireless telephone messages. Of course, in case no code is required as the voice comes through th ceiver the same as through the regular telephone. (For fu details on Wireless Telephony, see "The Wireless Telephone," by H. Gernsback, at also Lesson No. 18 of The Wireless Course.)

The question asked mostly by the layman is: "How far can I receive with such and such an outfit, my aerial being so high and so long?"

Nobody can correctly answer such a question. You can reason it out as well as we can. For example: Would you ask us: "How far away can I hear the steam whistle of the X & Y Cotton Mill?" No, you wouldn't, for it all depends. First, how hard the whistle blows, second, how good your hearing is, third, how the wind blows, and fourth, how many and how great are the intervening objects between the whistle and your ear. Some days you may hear the whistle two miles off with the wind blowing your way. Or if you are way down in the cellar you may only hear it faintly, although you are but two blocks away from it. It all depends. The one thing you are sure of is that the whistle blows with about the same strength each day. The same reasoning holds true for wireless to a very great extent.

Distance

As a rule, the higher up and the bigger your aerial, the better the wireless reception will be. Naturally if you are a thousand miles off from a station that can but send 500 miles, you won't hear it, no matter how good your instruments are. It's like trying to hear the sound of a whistle 10 miles away from you, that can at the very best be heard only within a radius of 5 miles.

Just use a little horse sense and you can do your own deducting: no wireless expert is required. It is also evident that the messages cannot come in with the maximum loudness unless the instruments are well in tune, and unless well designed instruments are used. Thus a loose coupler will give louder signals than a small tuning coil. It also depends a lot on the detector and its adjustment.

This is the way the detectors range according to their sensitiveness:

1st, The Audion (the most sensitive detector to date); 2nd, The Electrolytic; 3rd, The Peroxide of Lead; 4th, The Perikon; 5th, Zincite and Bornite; 6th, Silicon and Galena; 7th, Iron Pyrites (Ferron); 8th, Carborundum; 9th, Molybdenite. (See Lesson No. 10, of The Wireless Course, on Detectors.)

If you are entirely surrounded by high mountains or steel buildings, you naturally will not expect to receive messages as well as if you were on the top of a mountain. Also remember that wireless waves travel **twice as far over water as over land,** and that you can reach **twice as far after sundown than during the daytime.**

This seems to be the greatest stumbling block for most beginners. Again let us make a comparison. Take two pianos and place them in the same room. Or two violins will do as well. Tune two strings, one on each instrument, so both will give exactly the same note. Pick one of the strings in order to sound it, and the other "tuned" string, although 10 feet away will sound in unison, although you did not touch it. **Both are now in tune.** Both give out the same (sound) wave length. No mystery here. The secret lies in the fact that both strings ARE OF THE SAME LENGTH, and have the same tension, roughly speaking. Make one string longer than the other and both are "out of tune."

Wave Lengths and Tuning

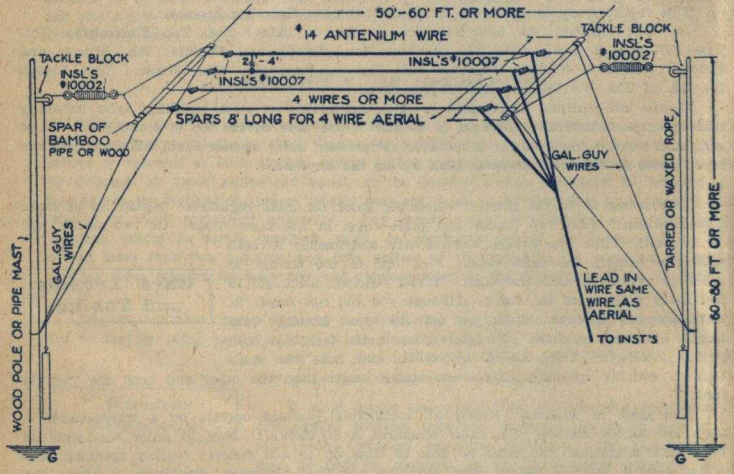
The same in wireless. Nearly all commercial stations operate on a wave length of from 300 to 600 meters. (A meter measures 39.37 inches.) Now in order that you can hear such a station, you must be able to tune up to 600 meters; roughly speaking your aerial should be 600 meters long electrically. That, however, would be a pretty expensive and cumbersome aerial. Besides it isn't required. We simply wind, roughly speaking, 600 meters of wire on a coil or drum and our aerial can now be quite small, within certain limits of course, and we can for this reason "catch" the station having

a 600 meter wave length, providing our other instruments are sensitive enough. By referring to our catalogue it will be seen that our No. 8486 tuning coil as well as our No. 12002 loose coupler have sufficient wave length capacity to catch 700 meter waves. As they are both provided with adjusting sliders, more or less wire can be put into the circuit, and therefore both these instruments can be used to catch wave lengths from 100 up to 700 meters, but not over this amount.

Therefore, if we should want to hear a station having 1400 meters wave length, we would connect two No. 8486 tuning coils in series, which would give us 700 + 700 = 1400 meters wave length. Or we would connect one No. 8486 tuner in series with the primary of the No. 12002 loose coupler and we would get the same effective wave length. As a rule only stations doing long distance work use excessive wave lengths, thus the Marconi Transatlantic station at Glace Bay has a wave length of about 7100 meters, while the new Government station at Washington, which sends messages over 3,000 miles, has a wave length of about 4,000 meters. By consulting the **"Wireless Blue Book"** the wave length of all important wireless stations can be found, as each station normally uses a certain prescribed wave length. (See Lessons No. 4. 5. 6. 7. 8. 9. of The Wireless Course.)

Aerial and Ground

The best all around aerial is about 75 feet long, composed of four strands "Antenium" wire No. 14, or stranded "Antenium" cable. One of the best forms is shown herewith. We recommend our No. 10007 insulators, although others as listed in our catalogue can be used. For a 75 foot aerial, the strands should be about two to three feet apart. For a 150 foot aerial from three to four feet apart and so on. The strands should never be less than 1½ feet apart even for a very small aerial. All connections should be soldered if possible. Use as many insulators as feasible, remember you have but little energy when receiving; few and poor insulators waste 50 per cent. of the little incoming energy. If you have a good spacious roof it is not necessary to use poles to



hold up the aerial. It may be stretched between two chimneys, etc. The spreaders to hold the wire strands apart may be of bamboo, wood, metal pipe, etc. If metal is used, the wire strands should be insulated from the former. (See Lesson No. 11, of The Wireless Course, on Aerials.)

The ground is quite important. Te best wire to use is a No. 12 copper wire run from the instruments to the water or as pipe using one of our No. 10003 ground clamps to make an efficient connection. If n water or gas pipe is to be had, bury a metal plate, copper preferred, not less than three feet square, in a good moist ground; a number of these plates connected to he ground wire would be preferable. The heavy ground wire is soldered to the plate, of course. It should be buried at least six feet deep. Another good ground is a six to ten feet long iron pipe rammed into moist earth, the ground wire being connecte to it, either soldered, screwed, etc. The ground wire running from ground to instruments should never be less than No. 16 B. & S. copper, and can, of course, be bare. Isulation on a ground wire is just that much waste.

The diagrams given in our catalogue show how to connect most of our instruments. Our $.25 book "Wireless Hook-Ups" nd our Wireless Course (Lessons 12 and 13), gives hundreds more of them, and our Engineering Department, on receipt of 10c to cover postage, wl be only too glad to furnish any hook-up to be used in connection with our instruments. Connections should be made with nothing finer than No. 18 B. & S. copper wire (Annunciator wire). All connections must be as short and straigh as possible. Avoid all wire crossings as far as practicable, f you can't avoid crosses, the wires should cross each other at right angles; and NEVER wind the connecting wire in coils ("curls") which may look pretty, but kills all wireless messages. Make all connections as tight as possible, a loose connection is worse than no connection at all.

Connections and Hook-Ups

We presume you have a complet receiving set. You proceed thus:

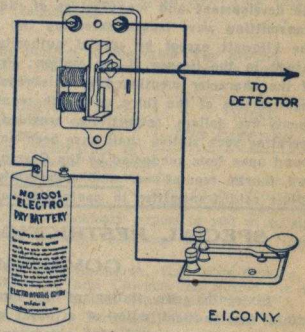
First, you must know if your detector is adjusted to its greatest sensitiveness. If a message is just coming in, you wil have little difficulty to adjust the detector to its best sensitiveness. If no message comes in you don't know if your detector is in its best receptive condition. For this reason, the up-to-date wireless man uses the "Buzzer test." Aside from giving imitation wireless buzzes, the buzzer set may be used **to pratice telegraphy.** It consists of three things: 1st—Anyone of our buzzers, such as our No. 954, or better our No. 965 o No. 950; 2nd—Our No. 1118 key; 3rd—A dry cell. Connections MUST be made as shown. Now every time you press the key you will get a perfect imitation of a wireless signal and it becomes child's play to adjust the detector to its greatest efficiency. The buzzer tes can of course be used with ANY detector. I saves lots of time and bother and is quite necessary. Sometimes a detector may have a "dead spot" and you might be "listening in" for hours, without being able to catch as much a one dot. The buzzer test makes such an occurence impossible.

Reception of Messages

In order that the buzzer itself is not heard directly, it is usually wrapped n absorbent cotton or wadding which muffles its sound effectively, or it may also be placed in another room.

When the detector is adjusted the tuning coil (or loose coupler) is regulated by moving the slider or sliders back and forth till the signals are heard the loudest. If the loose coupler is used the secondary is moved back and forth in addition, till the best position is reached. Now the variable condenser (or condensers) are adjuste, if required.

The variable condenser is of the greatest use during excessive "static," which sometimes interferes seriously, during summer weather, especially when "taking" a long distance message. It is also of invaluable help to "cut out" unwanted messages when two or more are "coming in" simultaneously. Thus by adjusting the tuner (or loose coupler) in conjunction with the variable condenser it is often possible to cut out all interference from unwanted stations.



Only one wire goes to detector.

It is an excellent idea to have several detectors in a station, arranged in such a manner that by means of a multi-point switch any one of them can be thrown into the circuit. It will thus be found, that some stations, especially during interference, can be heard better on a certain detector than on another. Some will be found to work best for long distance work, others work best for medium distance, etc., etc. (see also "Wireless Course," Lessons No. 8 and 9).

Let us quote the law, as far as the amateur concerned, before going any further:

THE WIRELESS ACT

Transmitting Stations

"Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled; That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication* as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the transmission of radiograms or signals the effect of which extends beyond the jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby, with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a license, revocable for cause, in that behalf granted by the Secretary of Commerce and Labor upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the same State; Provided, That the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction."

*Wireless Telegraph or Telephone sending stations included.

GENERAL RESTRICTIONS ON PRIVATE STATIONS

"Fifteenth. No private or commercial station not engaged in the transaction of bona fide commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wave length exceeding two hundred meters or a transformer input exceeding one kilowatt except by special authority of the Secretary of Commerce and Labor contained in the license of the station; Provided, That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of one hundred dollars or twenty-five dollars, respectively, provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter has been found upon tests conducted by the Government, to be so adjusted as to violate the said third and fourth regulations, and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

SPECIAL RESTRICTIONS IN THE VICINITIES OF GOVERNMENT STATIONS

"Sixteenth. No station of the character mentioned in regulation fifteenth situated within five nautical miles of a naval or military station shall use a transmitting wave length exceeding two hundred meters or a transformer input exceeding one-half kilowatt."

Let us explain in plain English just what this means: As you notice from the first paragraph, the part which we underlined, it is pointed out to you that the law does not concern you unless you send messages from one state into another. You therefore do not require a license as long as your messages do not reach over the border of your state and if you do not interfere with a station's business (in your state) which receives messages from another state. Of course, you want to know how you can tell what your transmitting range is. We will explain.

It has been proved by experience with spark coils, that in almost all cases a one-inch spark cannot possibly reach over eight miles. From this information the following table has resulted:

TRANSMITTING DISTANCES OF SPARK COILS

¼-in. coil, Maximum trans. dist., 2 Miles.
½-in. coil, Maximum trans. dist., 4 Miles.
1-in. coil, Maximum trans. dist., 8 Miles.
1½-in. coil, Maximum trans. dist., 12 Miles.
2-in. coil, Maximum trans. dist., 16 Miles.
3-in. coil, Maximum trans. dist., 24 Miles.
4-in. coil, Maximum trans. dist., 32 Miles.
And so forth.

With open core transformers the spark length cannot be taken as a basis to figure distances, but the input in watts is used. It has been found that for each five watts input into the primary, not more than one (1) mile can possibly be covered.

Thus our No. 8050 transformer coil in conjunction with our electrolytic interrupter uses 5 amperes at 110 volts. That is 550 Watts. Five goes into 550 just 110 times. The maximum distance that can be covered with the No. 8050 coil (unless you use more current) is 110 miles. If you use but one secondary the distance that can be covered is cut in half, or 55 miles.

For closed core transformers we figure ten watts for each mile. Therefore, our No. 9281, ½ K.W. transformer will at best not send over 50 miles, and our No. 9282, 1 K.W. type will not send over 100 miles.

Knowing what the distance is, as the crow flies, from your locality to the nearest border of the next state, you can easily figure out what the maximum power is that you can use if you do not wish to take out a license. An example:

Suppose you live in the city of Columbus, Ohio. The nearest state line is Kentucky, about 86 miles in a direct line from Columbus. If you do not wish to be licensed you can use any spark coil up to 10-inch spark, or a ½ K.W. close core transformer..

Suppose your home is in Austin, Texas. The nearest state line is Louisiana, a distance of 230 miles. Thus you could with perfect safety use our No. S.O. 200 outfit, which does not reach more than 200 miles.

It is also pointed out that if you live within five miles of a Government wireless station you cannot use more than ½ K.W. power, though the next state border might be 100 miles or more distant.

Of course if you live close to another state, as for instance, in New York City, you are required to take out a license for any size transmitter.

What the License Is

The license has not been created to muzzle you; it is the other way around. Uncle Sam gives you a written order telling you that you can send messages to your heart's content, **and no one can tell you to stop sending,** as long as you do not create mischief.

The license is free, it costs not a penny. All that is required of you is that you are familiar with the law and that you can transmit messages at a fair degree of speed.

The law does not require that you take an examination in person if you are located too far from the **nearest** radio inspector. All you have to do is to take an oath before a notary public that you are conversant with the law and that you can transmit a wireless message. If you wish to be licensed—and we urge all amateurs to do so, as it is a great honor to own a license—write your nearest Radio Inspector (see below), and he will forward the necessary papers to you to be signed.

Radio inspectors are located at the following points: (Address him at the Customs House):

Boston, Mass., New York, N. Y., Baltimore, Md., Savannah, Ga., New Orleans, La., San Francisco, Cal., Seattle, Wash., Cleveland, Ohio, and Chicago, Ill. Also the Commissioner of Navigation, Department of Commerce and Labor, Washington, D. C.

In an interview with the **New York Times,** W. D. Terrell, United States Radio Inspector for the port of New York, said in discussing the new law:

"The new law regulating wireless messages will work no hardship to the amateur operator. It is the intention first, to classify the various operators and place each operator in his proper class. They will then be permitted to work or play as much as they please, but under an intelligent, general, supervision. Only those stations are affected which are near enough to the coastal stations to offer interference, or which work across the state lines which brings them under the supervision of the inter-State laws. I would like to make it very clear that the license costs the amateur nothing, and that the Government is willing to facilitate the wireless operators in every way possible to secure their license."

So much for the law. Everybody will now understand that the law is just and fair and that it gives the amateur a distinct standing in America, a standing which he does not enjoy in any other country. He knows what he can do and what he can't do, and no one can come to him and boss or abuse him, as Government or Commercial wireless operators were wont to do before the enactment of the law.

With sending outfits the reasoning is almost the same as with the receiving outfits. In order to select an outfit you must of course know where and how far you wish to send. Upon this, all depends.

Sending Outfits

As a rule—9 out of 10 of our customers have done it—two or more friends get the "Wireless bug" and order two or more complete transmitting sets. Of course, the outfits selected must necessarily be powerful enough to cover the intervening distance between the houses of the friends, and this only you know.

Therefore if you and your friend decide to converse by wireless and if the distance between your two houses is 10 miles you will buy either our outfits No. SO-10 or SO-15 (S.O. stands for Sending Outfit, the number indicates the mileage that the outfit will cover). Of course, a more powerful set may be used, although there is no particular advantage in doing so, except perhaps that the incoming signals of necessity will be louder with the more powerful sets. It goes without saying that almost ANY receiving outfit which we list can be used with ANY of the sending outfits. Bear in mind that the selections which we give with our sending outfits do not have to be used if not wanted. Thus our "Interstate" outfit or even our "Transcontinental" receiving outfit can be used with the SO-¼ set. For if you and your friend live one-quarter of a mile apart and both of you have SO-¼ Sending outfits, you probably want to have a receiving outfit with which both of you can pick up messages 2,000 miles distance. In that case you would order two SO-¼ sending outfits only, and two RO-2000 outfits, or else two "Transcontinental" receiving outfits. If either you or your friend feel that you cannot afford such a set, why then get the set that you can afford best and that suits you best. As you see there is no hard and fast rule about the relation of sending and receiving outfits. On the other hand we don't have to tell you that if you order two S.O.-200 outfits you require of necessity a good receiving outfit, else you couldn't hear the station 200 miles off. A little common sense will help everyone decide just what combination to order.

Like receiving sets, the transmitting sets are divided into two groups. The un-tuned (open circuit) and the tuned (closed circuit) ones.

Sending Apparatus

The untuned ones have, 1st—a spark coil, 2nd—source of power, usually dry cells or a storage battery, 3rd—the spark gap, 4th—the key.

Such outfits can be used only for very short distances and should never be used above three miles. When connections are made by following the blue prints, which we supply with all sets, the pressing of the key gives a strong spark in the spark gap. The spark gap (the open space between the zinc plugs) from the smallest to the largest sets, must never be more than one-eighth to three-sixteenths of an inch. A bigger gap does not work. Pressing the key long gives a dash, pressing it but for a fraction of a second gives a dot. Combinations of these represent the telegraphic characters; the code can be learned in a few weeks, practicing twice a day from one-half to one hour. (See Lesson No. 15, of The Wireless Course.)

In the tuned outfits, we have in addition to the above enumerated apparatus: 5th—The Leyden jars, or condenser; 6th—The Helix, or oscillation transformer. The Leyden jars change the red spark obtained from a spark coil, into an intense blue-white crashing spark. The Leyden jars also create a train of fast oscillations and go to make the outfit far more powerful although no more battery power is required. The Leyden jars also give better "carrying power," as the signals can be heard more distinctly and not "mushy" as if no Leyden jars were used. For each outfit the best jars or condenser has been selected and no changes should be made here.

The helix as well as the oscillation transformer, are, to the sending outfit, what the tuner and the loose coupler respectively, are to the receiving outfit. The helix or the oscillation transformer is the tuning coil pure and simple for the transmitting station. Like the tuning coil the helix and the oscillation transformer have sliders or else clips by means of which more or less wire convolutions can be put in the circuit of the aerial. Therefore more or less wire, and consequently more or less wave length is added to your aerial. Again there is not much of a mystery here. Anyone understands it. (See Wireless Course Lesson No. 14.)

In the larger sets where the battery power is insufficient as well as un-economical we have two methods open to fill the gap. One is the Gernsback electrolytic interrupter working on 110 volts Direct or Alternating current, which supplies the spark coil (trans-

former coil) with the power; the other method requires the use of a CLOSED core transformer operating without any kind of interrupter direct from the alternating current supply. This kind of transformer, however, does not work on the direct current, not even in connection with the electrolytic interrupter. The choice, for this reason lies entirely with you.

The aerial switch is an absolute necessity where both a sending and receiving set is used in one station. If you are through receiving a message from your friend, you, of course, wish to answer him. You therefore, must switch the receiving set off from your aerial and switch the sending set onto the aerial. The aerial switch does all this in one operation.

For sets using nothing higher than a 2½-inch spark coil an ordinary double pole, double throw switch may be used. For heavier sets using more power our Antenna switch No. 8100 must be used, as the smaller switch cannot carry the necessary power. We furnish complete diagrams for the connections.

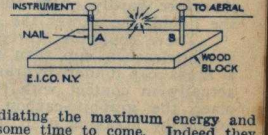
Sending a Message

In order to send messages it goes without saying that you must know how to "tap the key." The easiest way to learn, and the cheapest way at the same time, is to get a buzzer set as explained under "Reception of Messages." With this set which represents a first class learner's outfit you can send yourself dots and dashes to your heart's content until your wrist has limbered up sufficiently to do rapid sending. After a few weeks' practice it will be as easy to send a telegraphic message as to write on a typewriter.

If your friend has a wireless and starts learning the code with you, it becomes very simple for both of you to soon become proficient in the art. Each will send to the other, the Morse or Continental alphabet, which is sent back and forth till the right speed is obtained. After this certain words are exchanged between the stations; later on short sentences are sent and so forth, till it becomes possible to converse freely by wireless.

There is but little adjusting to do when sending. As a rule amateurs converse with only one, seldom two, and rarely three stations. For this reason much adjusting is unnecessary. When using a small set comprising spark coil, Leyden jars and helix it becomes first necessary to adjust the Leyden jars. Either more or less jars (which adds more or less capacity to the circuit) are used till the spark sounds loudest in the spark gap and appears most powerful. A little experimenting will quickly tell when the right capacity is used. **It is important to understand that the capacity should be adjusted only when the spark gap is connected to aerial and ground.** (See Lesson No. 14, Wireless Course.)

The next important adjustment is in the helix (or oscillation transformer if this is used in place of a helix). To change the clips around on the helix (or on the oscillation transformer) it is necessary that a small gap is first made in the aerial circuit. This is done best by driving two nails in a piece of very dry wood, and connecting the aerial wires to each nail as shown in sketch. The two wires A and B are brought close together now and when the key is pressed down a small spark will jump from A to B showing that you are charging the aerial and that energy is radiated from same. Now change the adjustment on the helix (or oscillation transformer) till the longest and fattest sparks jump between A and B. To do this A and B are separated until a point is reached where the spark cannot jump any further. You know now that you are radiating the maximum of energy and the point on the helix (or adjustment on the oscillation transformer) should be carefully marked so you will know at any time just where the maximum is. It goes without saying that you should also note how many Leyden jars (or how many condensers) you are using when making the test and you should write this information down, for if you were to use more or less Leyden jars (or condensers) you would have to change the adjustment on the helix (or oscillation transformer) as explained above. Now after the maximum "radiation" has been ascertained, the test block with the nails is discarded and the break in the aerial wire connected again. You know now that your station is radiating the maximum energy and adjustments of the sending set will not be required for some time to come. Indeed they may be left undisturbed indefinitely.



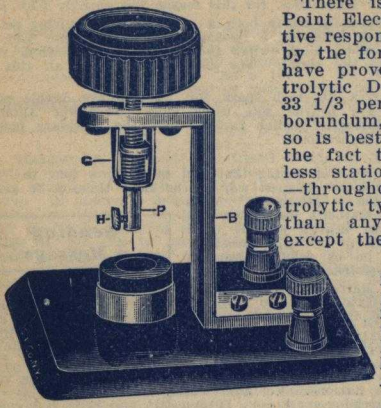
We believe that we have made everything as plain as possible and that by reading this treatise the elementary points of "Wireless" must become plain to even the layman. If, however, you desire additional information, our engineering staff will be only too glad to answer your questions promptly and explicitly. Now it's up to you to get busy and "start something"!!

FINIS.

Copyright 1913 by E. I. Co., N. Y.

THE BARE POINT "ELECTRO"-LYTIC DETECTOR

(Patents Pending.)



No. 9002 (With Hard Rubber Posts and Base.)

There is no doubt but that the Bare Point Electrolytic is one of the most sensitive responders invented. Comparative tests by the foremost men in the wireless field have proven beyond doubt that the Electrolytic Detector is fully 25 per cent. to 33 1/3 per cent. more sensitive than carborundum, silicon, etc., etc. That this is so is best proven by calling attention to the fact that nearly all up-to-date wireless stations—commercial and government—throughout the world now use the Electrolytic type, as its range is far greater than any other detector in existence except the Audion.

We experimented for over six months, and the result is our present No. 9002 Detector, which is, despite its low price, unquestionably the BEST AND MOST EFFICIENT TYPE on the market. Mind you, we do not except ANY.

Furthermore our new instrument is not an amateurish makeshift, but has been designed for hard commercial work.

DESCRIPTION.

Instead of the carbon—to hold the acid—we use now a graphite-carbon cup, which we absolutely guarantee will never leak. The reason is that this cup is non-porous, it being "formed" under a pressure of 300 tons, and afterwards treated in the furnace to close up any microscopic holes. The acid will positively never soak into the cup. Ordinary carbon or graphite—as anybody can readily convince himself by a trial—will absorb the acid in less than ten minutes. This is true even of the best and hardest imported carbons.

We use a very small graphite cup, to hold but little acid. Several reasons prompted us for doing so. First, a small body of liquid will adhere to the container better than a large one. Shocks and unsteady position (on ships) will therefore hardly effect our instrument. Secondly, the smaller the surface of the liquid, the slower the evaporation.

There could be scarcely a better method of establishing contact with the graphite-carbon cup than the one we have adopted. The cup is forced into a brass cap under hydraulic pressure, so that three-quarters of the cup is actually in contact with the brass cap. This is a "forced fit," and once in place the graphite-carbon cup can never be removed from the brass cap, except by breaking it in pieces.

The most important part of an Electrolytic Detector, however, is found in the mechanism used to raise and lower the fine Wollaston wire.

The ideal way, of course, is to move the wire up and down strictly vertical, so that one can dip it more or less in the electrolyte (acid). This method has been adopted in our new instrument. It is unquestionably an ingenious movement.

Washington, D. C.

Gentlemen:

I use your electrolytic bare point detector, and I find it to be AN EXCELLENT INSTRUMENT.

Yours very truly,

A. L. CAPERTON.

Chuck P, holding the fine wi, has at the upper end a flat guiding rest, under which a spring is located which tends to press P upward. This is counteracted by the adjusting thumb-screw, which, by pressing on the flat part on P, raises or lowers same. It will. It is impossible for the pin P to turn, as the flat guiding rest can only move up or down (it being square) in the guiding angle G. The large hard-rubber thumb-screw prevents current leakage through body; it allows extremely fine adjustments, and gives the instrument a distinctive appearance. The screw itself is molded in the hard-rubber, and therefore never becomes loose. The screw, furthermore, having a very fine pitch, makes it possible to raise or lower the fine wire less than 1-1000 inch at a time. This allows very fine adjustments.

The polished aluminum bracket is of generous proportions and unusually heavy in order to stand rough and continuous handling.

The Wollaston wire W used is the very thinnest platinum wire obtainable. Its diameter is 0.0001 inch. All Wollaston wire comes heavily silver-plated. The acid soon dissolves the silver, leaving only the minute platinum wire of 1-10,000 inch diameter.

The best part, however, is that it is unnecessary to solder this fine wire, which method, not alone inconvenient to many, is too troublesome and takes too much time.

Pin P at the lower part has a fine hole ½ inch long, into which the wire is inserted, then the small thumb-screw I is tightened and the wire is secure.

We also furnish (with the instrument only) a novel wrinkle how to handle and insert the fine wire in the hole, without the screw H damaging the fine wire in the least, even if screw up quite tight. With this method it is possible to use the last ⅛ inch piece of wire, which heretofore was impossible. One inch of wire therefore will last long while.

The base (size 3½" x 3½") is ¼" thick, and molded of hard rubber composition. Impossible to shrink or warp. It gives the Detector a business-like appearance, and is, of course, acid proof; it is a far better insulator than the best wood. Local leakage, therefore, is an impossibility.

Two binding posts are provided.

ALL METAL PARTS ARE HEAVILY SILVER-PLATED, as only this will prevent the electrolyte from tarnishing the metal. The brilliant white metal parts give the instrument a very distinctive and unique appearance, which will enrichen any instrument-table.

We cannot send the acid through the mails or by express. We furnish rubber-stoppered bottle, which bears formula how to prepare the electrolyte. It can be obtained at ANY drug store. **Formula is only given with order.**

One of our "Electro" Potentiometers should always be used when a battery is in circuit, else the strong current will soon dissolve the minute platinum wire of the Detector.

The Potentiometer further eliminates all humming noises sometimes experienced in the telephone receiver.

HOW TO OPERATE THE "ELECTRO"-LYTIC DETECTOR.

The cup should be filled by using the pipette which we furnish.

If a battery is used, its carbon, or positive pole, must invariably be connected with binding post marked +. If all electrical connections are complete as plainly indicated in plate, screw down the thumb-screw far enough to let the Wollaston wire JUST TOUCH the solution. With little experimenting the right immersion into the acid will be found, and the best regulation is reached when the telephone receiver emits a faint hissing sound or click. The telegraphic signals come through the telephone receiver in short and long clicks or buzzes, respectively.

The only wire that can be used in our Detector is the No. 1313, or better, No. 1314 Wollaston wire. As this wire is silver-plated, it will not work until the silver coating has dissolved. This is done by im-

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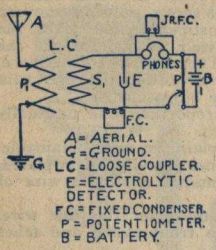
Gentlemen: **Rivera, Cal.**

I bought a rheostat and electrolytic detector of you some time ago, AND AM VERY MUCH PLEASED WITH THEM. I wish that half of the electrical goods that are put on the market WERE AS GOOD AS YOURS.

Yours Resptfully, FRANK L. WHITE.

mersing the wire in the acid for about ten minutes and using a fairly strong current (2 dry cells). After this the coating dissolves as the wire is used.



Important Notice.—We have found that it is not necessary to draw off acid each time the detector is used. By means of pipette place a drop (not more) of ordinary kerosene oil, or better paraffine oil, on top of the acid in the carbon cup. This effectively prevents evaporation, and the acid may be left in detector for weeks. **The detector action is not affected whatsoever.**

9002 BARE POINT "ELECTRO"-LYTIC Detector (Patents Pending), as described, with pipette, bottle for acid, packed in wooden box, complete **$1.25**

"Electro" Name Plates

Pursuant to many requests from our customers we have placed on the market a line of name plates which will make a handsome addition to any instrument or table. Our plates are made in two styles, German Silver and Brass finish, 1-64 inch thick. The lettering is **CHEMICALLY ETCHED**, lettering in relief. There are two holes to fasten the plates to the table or instrument box.

The large size plates measure 1¼x½. The small ones measure ⅝½.

Prices the same for either Brass or German Silver finish.

No. 1770	"Ground" Name Plate ..... each	**$0.10**
No. 1771	"Shunt" Name Plate..... each	**0.10**
No. 1772	"Aerial" Name Plate..... each	**0.10**
No. 1773	"Battery" Name Plate..... each	**0.10**
No. 1774	"Phones" Name Plate..... each	**0.10**
No. 1775	"On" Name Plate..... each	**0.07**
No. 1776	"Off" Name Plate..... each	**0.07**
No. 1777	Complete Set, all seven plates.....	**0.50**

Rouss Physical Laboratory, University of Virginia.

Dear Sirs:

In response to your inquiry of yesterday G-7-13 I would say that the original order of nine machines is correct.

FOR STUDENT USE THEY MEET THE needs of our Laboratory administration better than anything of the sort we have seen. Hence the duplication.

Very truly yours,

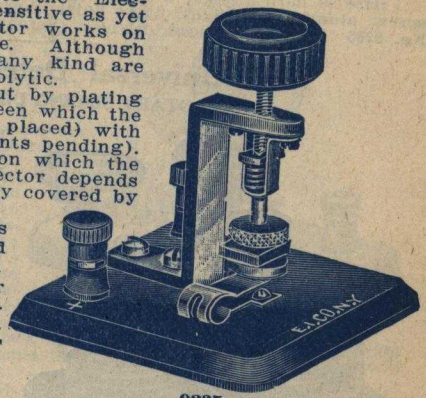
L. G. HOXTON.

THE PEROXIDE OF LEAD DETECTOR
THE "DRY ELECTROLYTIC"

(Patents Pending)

This detector, next to the "Electro"-Lytic, is the most sensitive as yet devised. Our new detector works on an entirely new principle. Although no acids or liquids of any kind are used, the action is electrolytic.

This is brought about by plating the detector plates (between which the peroxide of lead pellet is placed) with certain rare metals (patents pending). This process of plating—on which the entire success of the detector depends—is a secret one and fully covered by us.



9235

This detector works only with a battery, and to obtain the very best results our potentiometer should be used in connection with same. The positive pole of battery MUST be connected to post marked +.

This detector is wired the same as the "Electro"-Lytic one, and we guarantee it to be the next sensitive one on the market.

It is especially desirable for portable sets, or sets subjected to shocks or jars.

Once adjusted it will not get out of order easily.

It is not affected by sending messages nearby, nor will it lose its adjustment when receiving from nearby power stations. Our new spring platen gives a marvelously fine adjustment, and on account of the large working surfaces of this detector it is especially efficient for **WIRELESS TELEPHONY.**

We furnish wth each detector a generous piece of **peroxide** of lead, which we manufacture ourselves and which is chemically pure.

The adjustment of this detector is similar to that of our now famous "Electro"-Lytic detector. The large rubber thumb screw makes shocks through the body, while adjusting, an impossibility.

The lower spring platen is "leadized," while the upper plate or disc is heavily platinized (patent applied for).

Heretofore the peroxide pellet had to be clamped between a lead and a platinum sheet, as only with these two metals the peroxide of lead will detect waves.

By plating the holders with the two mentioned metals we have accomplished a distinct advance and save the operator the handling of the two extra metal sheets.

For short distances the adjustment need not be fine, but a rather good pressure should be brought upon the peroxide.

Dear Sirs: Fort Morgan, Col.

Received my Peroxide of lead detector this morning, AND AM QUITE SATISFIED WITH IT. It is the NEATEST INSTRUMENT on my table. I have already RECEIVED WITH IT AND IT WORKS TO PERFECTION.

Yours truly, F. E. ISBELL.

For long distance work very light adjustment is required.

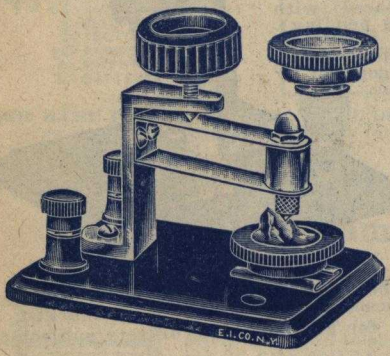
A VERY important feature of this detector is that it is possible TO TUNE with same. A light contact will bring in a far distant station, while a heavy contact brings in the one located at but a short distance.

Base is hard rubber, 3 x 3 x ¼ in., hard rubber posts and thumb screw, **aluminum** upright, finest finish throughout.

No. 9235 Peroxide of lead detector (patent pending).....**$1.25**

New Universal Detector Stand.

WITH ROTARY SLIDING DETECTOR CUP



7777

Our new Mineral-crystal Detector Stand has been devised by us after long experimentation and stands in a class by itself. It is used chiefly for experimentation purposes and has the most sensitive arrangement of any detector on the market. It is hardly necessary to waste words on the superiority of this instrument over other similar ones. By studying the cut, the many excellent features of this detector will appeal even to the layman.

The crowning achievement, however, is found in our new rotary sliding cup. The brass cup has a massive, knurled fibre ring and the lower part of the cup is fashioned in such a manner that it can slide back and forward in the metal slide. ANY PART OF THE DETECTOR SUBSTANCE can thus be covered by the detector point. Ours is the first detector to achieve this. **Furthermore the entire cup can be slid out entirely and another one substituted in 5 seconds.**

The upper double spring arrangement has a blunt brass point, to make contact with the crystal or mineral.

The novelty is that with this Detector we furnish a quantity of **SOFT METAL** which is packed around the crystal or mineral into the detector cup. This soft metal: HUGONIUM, is furnished in a small bottle and when **placed in hot water** immediately melts. Upon cooling it becomes hard as copper.

All metal parts are nickel plated and polished, base is of solid opal glass. Two hard rubber binding posts are provided.

No. 7777 New Universal Detector Stand, as described.....**$1.50**

For extra Cups see page 168.

THIS DETECTOR IS NOW EQUIPPED WITH GALENA CRYSTAL.

No. 7778 Hugonium, soft metal, to mount crystals or minerals, oz. bottle **$0.35**

Tucson, Arizona.

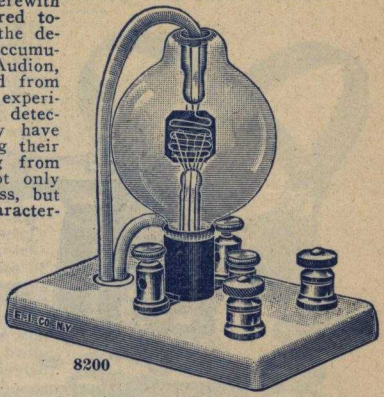
Dear Sirs:

I received the detector in FIRST CLASS CONDITION. I AM ABLE TO PICK UP MESSAGES VERY CLEAR. I will recommend this detector to all whom I know.

Yours respectfully, H. O'LEARY.

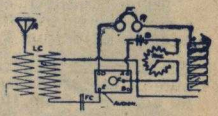
The "Electro" Audion

After long deliberation, we herewith resent the best audion manufactured to- ay in the United States. Of all the de- ctors in use, none present the accumu- tion of advantages offered by the Audion, ie "Electro" model being designed from ie result of long and extended experi- ents. While the crystal types of detec- r present many advantages, they have ie one great defect of not holding their djustment, especially on receiving from nearby station. The Audion, not only anks as the highest in sensitiveness, but ossesses that much sought for character- tic, stability of adjustment. Loud gnals do not affect the adjust- ent, and, on the contrary, seem improve the sensitiveness. When eceiving from loud or nearby sta- ons, the light will be noticed to icker in the bulb, and the signals an thus be read without the use a telephone receiver, this fea- ure being found in no other de- ector. Signals received by the udion are extremely loud, and most stations in the vicinity of the receiving tation may be heard with the phones three feet or more from the operator's ars.



8200

The "Electro" Audion, consists of a vacuum bulb containing two filaments f tantalum, connected in series with a lead taken off at the connecting point of oth filaments. One filament is used at a time, and at the exhausting of one fila- ent, the other may be resorted to. This gives double the life which is obtain- ble from other audions. The filaments are used on 4 volts, which may be ob- ained from storage battery or dry cells. The bulb also contains a wire which s bent in a zig-zag form, and called the "grid." A small sheet of nickel foil s also contained in the bulb. It is behind the grid and the metal foil. Under ormal conditions, the current from a 30-35 volt battery connected with a elephone receiver has great difficulty in passing through the heated vacuum pace. However, on reception of the wave trains, the current from the attery passes through the vacuum and produces an audible sound in the eceiver. The audion is the most suited detector **for wireless telephony** owing o its faithful reproduction of every wave. The 30-35 volts required for the elephone receiver circuit, may be obtained from 6 to 7 flash light batteries. nasmuch as the current used is practically zero, a et of these cells will last for a long time. The ap- aratus is connected as shown in the diagram. In his instance a loose-coupler is shown, giving the set he maximum degree of selectivity. The rotary heostat is also used, our No. 5000, which is very uitable for this purpose in regulating the filament urrent. The flash lamp dry cells are also shown onnected in series with the telephone receiver.



IMPORTANT: On account of the great manufacturing difficulties e do not guarantee the Audion. We carefully test each and every one ut cannot take back Audions under any circumstances whatever.

Full instructions given with each instrument. Size of base, 5¼ in. 3½ in. Height, 3½ in.

MOUNTED ON SOLID OPAL GLASS BASE.

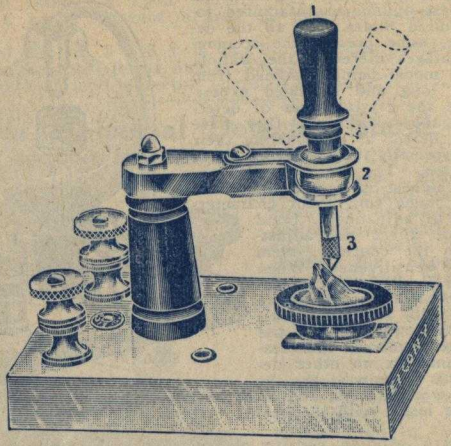
o. 8200 The "Electro" Audion as described and illustrated.....**$5.00**

Dear Sirs: **Portland, Ore.**

I bought some of your instruments last summer, and they are work- ng fine yet. I can say I GOT MY MONEY'S WORTH AND A WHOLE OT MORE OUT OF THE OUTFIT.

Yours truly, MR. J. B. BLAKESLEE.

The "Electro" Commercial Detector Stand



No. 9500

With 7/8 inch Italian Marble Base and Rotary Sliding Cup.

This instrument lately perfected by us stands in a class by itself. is the highest grade Detector Stand ever introduced in the United State It will appeal to all who wish a high grade instrument at a reasonal price.

Specification: Heavy marble base 7/8 inch thick, size 4½x3 inch Hard Rubber Pillar, on which is supported a nickel plated castin which holds the ball swivel 2. As will be noted, the handle, 1, may moved sideways in any direction on account of the swivel-ball arrang ment; a feature not found in any other detector. This is quite an i portant feature, as it is often necessary with certain substances to "fe over the surface in order to find the most sensitive spot.

The handle, 1, **can also be pulled up vertically,** as it is held back a spring inside of the ball. Any amount of tension of the spring may had by adjusting knurl, 3. This gives to the contact point on the tector substance any required tension. Therefore this detector is c able of the greatest variations, not alone in its free movement, but it be adjusted **from the lightest contact to the heaviest.**

Only the best materials are used in the construction of this detect all metal parts being finely nickel plated and highly polished.

There are two heavy nickel binding posts and there is a FE **COVERING ON THE BOTTOM OF THE MARBLE BASE.**

Size over all 4½x3x5 inches.

No. 9500 "Electro" Commercial Detector Stand, as described. Price $3

Cassopolis, Mich.

Dear Sirs:

I have bought goods at Chicago from your branch office, wh were VERY SATISFACTORY. I intend now to purchase a mine detector and a head band for my receiver.

Yours respectfully,

CHAS. A. MACDONALD.

The Phones which Saved the "Republic"

(or rather its 500 human beings)

Operator Binns, the famous C. Q. D. man, used these Phones.

IGH RESISTANCE PRECISION HEAD RE-IVERS FOR WIRELESS TELEGRAPHY ND TELEPHONY. Transatlantic Type.

Adopted by the U. S. Navy, United ireless Co., etc.

These receivers embody the finest rkmanship, and in connection with r various Detectors and other instru-nts are so marvelously sensitive that ey will talk loud and distinct where ers would not respond at all.

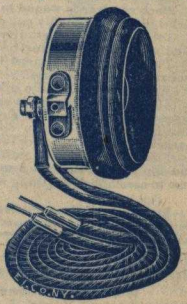
We make the broad and sweeping state-ent that our receivers are absolutely e most sensitive in the world now—thout any exception and regardless of ice.

The two largest commercial wireless mpanies in the world now use our re-ivers, which alone is proof of the su-riority of our phones. We have hun-eds of testimonials from enthusiastic ners of our headphones.

The weight is 20 per cent. less than her similar receivers; operators do t tire with these even if carried hours a stretch on head. The head band is adjustable to fit any size or any ape head; the stirrups holding the phones are made so ingeniously t the phones are pressed tight to the ear, excluding all external noises.

Each receiver is wound to 1000 OHMS with No. 50 single silk copper re which explains the extraordinary sensitiveness.

Some makers use No. 40 silk covered or enameled wire. This is abso-tely unfit to use as we found through long experiments. No. 50 wire sts six times as much as No. 40, but we use it because we increase with use the AMPERE TURNS and the receivers consequently become finitely more sensitive. We guarantee each receiver stand the following extraordinary test: Moisten or t the metal receiver cord tips. When both are ched the receiver will respond! The voltage gener-ed by the metal tips is less than 1/1000, the amper-e less than 1/1,000,000 (one millionth.) Bands and ceivers finely nickel plated. Silk conductor cords, feet long, etc.



No. 1305	Head receivers (2) with head band..	$6.35
No. 1306	One head receiver, head band and cord	4.35
No. 1307	Receiver only with 3 foot cord.....	2.50
No. 1308	Double head band only (no cord)..	1.50
No. 1024a	1000 ohm single pole receiver.....	1.00

We wind these receivers to ANY resistance wanted. Write for prices.

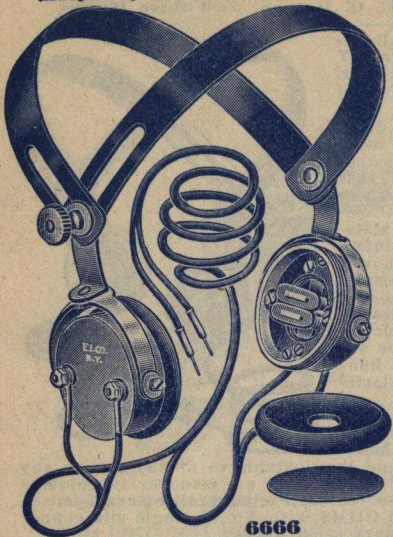
ear Sirs: Brooklyn, N. Y.

I want to congratulate you for putting out such good receivers, imely: the "Transatlantic Type." WITH THE ABOVE RECEIVERS, ing silicon detector, single slide tuner, loose coupler, and an aerial 4 wires, about 50 feet above ground, I can receive quite distinctly hen Cape Cod sends out. I also get many nearby stations.

Yours respectfully, C. L. SCHWIRZER.

THE ELECTRO "Government" PHONES.

Highest Precision Phones Made in the United States.
(Adopted by several Governments)



6666

We have sold more Wireless Telephone Receivers during the past nine years than all the rest of our competitors combined, and while we thought that our No. 1305 Phones could not be improved in any way, we have had right along a demand for a higher price receiver and after experimenting for two years we have at last gotten out a high grade professional type which eclipses anything shown heretofore.

We still maintain that our No. 1305 Phones cannot be matched for the price anywhere and to-day the same as years ago, they hold their own against receivers selling from $13.00 all the way up to $20.00 a set.

The difference between our "Government" phones and the 1305 type is merely in workmanship.

The receiver shells are made of Aluminum which makes them considerably lighter than other sets. The diaphragm is not enameled. It is plain metal but is of an extraordinary thin dimension, which increases the sound quite a little.

The magnets are wound with No. 50 B & S. SINGLE SILK COVERED WIRE, NOT enamel wire.

The magnets are a great deal more powerful, being made of the best imported Swedish steel, which we guarantee.

The Magnetic power of this receiver is the highest of any and the entire headgear can be lifted up by its own magnetic power, a thing which no other set can accomplish.

We lay particular stress on the magnets of this receiver and we guarantee that the magnets will not lose their strength for two years. We realize a wireless telephone receiver is not better than the strength of its magnets, hence we have extended all our energies towards producing something that can be relied upon, practically indefinitely.

While this head gear is the lightest on the market to-day we have not sacrificed its efficiency, as may be easily ascertained when testing out the sets.

Each receiver is wound to 1500 ohms, giving 3000 ohms per set. The head band is of German Silver, nickel plated and highly polished.

Other points of superiority: Light rubber cap (not composition), highest insulation, not only inside of the windings, to insure against breakdown, but the headgear is entirely insulated from the phones themselves.

The swivel arrangement is of the latest approved style, so that the phones will fit the ear snugly to exclude all external noise.

We use a six-foot pure silk covered cord with two tips.

As a reminder always be sure with whom you deal. Anyone can make extravagant, untruthful claims. Anyone can imitate us, for a certain time. Before you buy from any concern find out how long they have been in business. If you don't, you will buy their EXPERIMENTS, not a product that has been on the market for a decade, as for instance ours.

Finally look them up in Bradstreet's or Dun's and you will know whom you can trust with your money. And don't forget that the firm who "knocks" us most, is so busy thinking about us that it hasn't got much time to accomplish anything worth while itself. Now, that you grasp the situation read our

GUARANTEE.

Buy a pair of these phones and if it is not as sensitive or not as satisfactory as any set you have ever seen or if it does not compare in efficiency with any other make, return it to us and we will give credit for same at once.

No. 6666. Electro "Government" Phones as described..... **$7.7**
No. 6667. Single Receiver (no band or cord), 1500 Ohms..... **3.0**

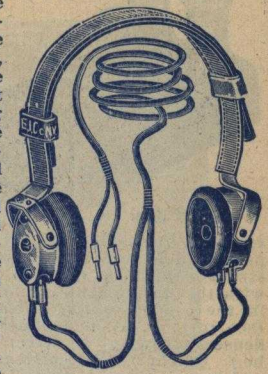
We wind these receivers to ANY resistance. Ask for prices.

Dear Sirs: Valparaiso, Ind.

I received your goods this week and AM VERY MUCH PLEASED ESPECIALLY WITH THE HEADPHONES; AS THEY ARE VERY SENSITIVE FOR THE PRICE. I would not sell them if I WAS OFFERED $10.00 FOR THEM. You may expect another order from me soon.

Yours very truly, ANTHONY A. WEMBER

"Electro" Amateur Wireless Phones.



8070

We herewith present our amateur type wireless phones which are superior to anything as yet. Our No. 1305 phones which are in use now by the United States Government, Marconi Co., etc., are of course a higher grade but our amateur phones are in every respect built as carefully, the only difference being that the finish is not so elaborate. These phones are wound to 1,000 ohms each receiver and are wound with **No. 40 enamel copper wire.** These phones have double pole magnets which are extremely powerful and made especially for wireless. The head band **is adjustable and leather covered,** and impossible to catch your hair. The receivers fit the head perfect. The weight is 15 ounces. With this set we furnish a beautiful finished six foot bifurcated green cord with nickel plated tips. The phones are made with swivel arrangements which make good fit possible. A test will convince you that our phones are superior to any other make and if they are not exactly what we claim them to be we shall refund the money.

No. 8070 Two Thousand Ohm Phones, as described..... $4.50
No. 8071 Receiver only (1,000 Ohms) as furnished with No. 8070 (double pole) 1.75
No. 8072 Leather Covered Double Headband (fits our No. 1024, 1024a, 8071) 1.50
No. 8073 Leather Covered Single Headband (fits our No. 1024, 1024a, 8071) 0.60
No. 8074 Nickel Clips, to hold two 8073 together, each..... 0.15
No. 8075 6 foot bifurcated green cord, each..... 0.45

"ELECTRO" "JUNIOR" WIRELESS PHONES.

8090

These phones are exactly the same as our No. 8070 described above with the exception that instead of using No. 8071 double pole receivers, we furnish the No. 1024a receivers. (For description see page 127.) While these are only single pole receivers it should be borne in mind that in connection with silicon or galena detectors, such phones will almost prove as sensitive as the 8070 kind. These phones are marvelously sensitive and will give a click when the two moistened tips are contacted with another piece of metal,—a test which very few high priced receivers will stand. German silver head bands with swivel, as well as six foot bifurcated cords furnished with the set.

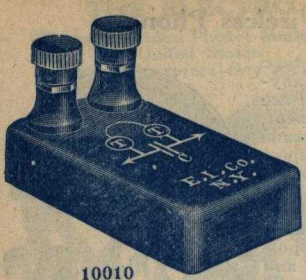
No. 8090 Junior Wireless Phones, as described, per set $3.25

Bar Harbor, Me.

Gentlemen:

I received your 2000 ohm receivers, AND AM MUCH PLEASED WITH THEM. I also have a pair of 2000 ohm receivers OF ANOTHER MAKE, AND YOURS ARE THE BEST BY FAR. I have one of your ¼ K. W. Transformers and interrupter and can EASILY SEND FIFTY MILES IN DAY TIME, USING A SMALL AERIAL WITHOUT ANY HELIX. Hoping I may favor you with my future orders, I am,

Yours truly, ARTHUR H. LAWFORD.



10010

"ELECTRO" JUNIOR FIXED CONDENSER.

The "Electro Junior" condenser is the outcome of long experimentation and is the SMALLEST AND NEATEST wireless condenser ever placed before the public. It has the largest sale in the U. S. for a condenser of this class It is entirely made of hard rubber composition and has hard rubber binding posts. There is also an ingenious arrangement to fasten it to the table or to the instrument board. Size over all 2⅝ in. x 1½ in., weight three ounces. This condenser is used mostly to shunt across the telephone receivers and is invaluable for silicon, carborundum, molybdenite, ferron, galena, and perikon detectors. We guarantee that the signals will come in fully 25% stronger with the addition of this condenser. A novel idea in connection with this instrument is that the diagram of connections is pressed right in the condenser top as seen in illustration. (Explanation of diagram (see cut): T. T., telephone receiver (or receivers); C, Junior" fixed condenser, arrows go to detector, or to detector and battery, as the case may be.) Of course the condenser can be used in other parts of the circuit and two or three of these in any wireless station will prove a great addition, not alone on account of the neat appearance of the instrument but also on account of the increased receiving range of the station. The condenser itself is sealed in the case and there are no parts to get loose and no bad connections.

This condenser will positively last a lifetime and cannot be punctured unless you connect it across the spark coil. CAPACITY IS .0165 M. F.

No. 10010. "Electro" Junior fixed condenser as described.... **$0.50**

"ELECTRO" FIXED CONDENSER.

10000

Our new fixed condenser for receiving is made up of two condensers in series, so that when placed in the closed circuit between the detector and the ground it is connected in series multiple. Before putting this condenser on the market we experimented for some months with various dielectrics, and finally discovered a substance which would hold up and at the same time was thin enough to use without affecting the capacity. Tinfoil used is the heaviest obtainable and sheets are cut by a die, in one piece with lug so that absolute uniformity and highest capacity are obtained. Condenser is enclosed in a neat oak case and filled with sealing compound. By using this condenser the strength of the signals received is increased fully 25 per cent. Connections ordinarily should be made as shown in our numerous diagrams among the Receiving Outfits, in this catalog.

Size: 4¾ ins. x 6½ ins. x 1 in.

No. **10000** "Electro" Fixed Condenser, as described..... **$1.00**

Bar Harbor, Me.

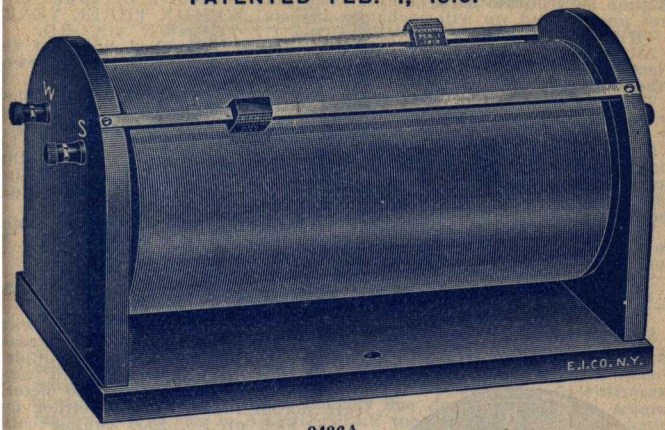
Dear Sir:

I received the order which I sent. **THE COIL GAVE AT LEAST ⅝ OF AN INCH SPARK AND IT WAS RATED AT ¼ INCH. Those two knife switches WERE "JIM DANDIES." You can expect an order soon.**

Yours truly, **GEORGE A. ROBBINS.**

"THE ELECTRO TUNER"

PATENTED FEB. 1, 1910.



8486A

The "Electro Tuner" which we present herewith is the latest word in a mmercial tuner. We were positively the first firm building this style, and e first type of this tuner was fully described in the July, 1908, issue of *odern Electrics*. It had only one slide, was more or less imperfect. There no doubt whatever that this tuner is the most popular one we manufacture, d the type described herewith is the *tenth* style evolved, and we believe it impossible to further improve on it. Our long years of experience vouch r superiority.

A Few Words to the Uninitiated.

Take two violin strings, having equal length and stretched with equal nsion. If now one is sounded with the bow, the other will sound in unison, though it has not been touched. *The two strings are tuned,* or both have e same tune. The same thing is true of piano strings and tuning forks.

The tuning coil for wireless purposes accomplishes a similar purpose. oughly speaking, if your friend has an aerial 60 feet long and you have an rial 40 feet long, theoretically you cannot receive from his station because u are 20 feet short. Now the tuning coil, having hundreds of feet of wire ound on its cylinder, is supposed to make good your deficiency. By moving e of the sliders your aerial (connected to the tuner) will be made artificially nger. Finally the slider passes a point where the total length of the tuner re has reached 20 feet. This, added to the aerial, gives 60 feet total—*you e in tune* with your friend's station. Thus a tuner accomplishes the purpose tune in in other stations, to tune out unwanted ones, etc., etc. In other rds, though your aerial is not very big, you can, with the aid of the tuner, lect the signals from other stations having larger aerials than your own.

The wave length of the "Electro Tuner" is approximately 700 meters 100 feet). According to the latest researches it is BARE WIRE WOUND our secret process. The convolutions approach up to 1/100 inch and are

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Minneapolis, Minn.

ear Sirs:

Just received my Electro Tuner and THINK IT A "DANDY" and m about to mail you an order for some more goods.

Yours respectfully,

V. A. BEERE.

wound with amazing precision, making finest tuning possible. There are over 300 convolutions of No. 20 B. & S. copper wire, and this tuner will tune as accurate as ½ meter. The wire is secured by means of a secret process and we will exchange any coil WITHIN THREE YEARS IF THE WIRE SHOULD COME LOOSE OF ITS OWN ACCORD.

All woodwork is of best seasoned oak, hand rubbed finish of the highest order. The base has holes so the instrument can be screwed to the table or wall.

The two metal slider rods are double nickeled and highly polished. Our well-known hard rubber sliders are used, one BLACK for ground, one RED for aerial. This feature is found only on our instruments.

Our sliders are now equipped with a medium hard BRONZE BALL which does not wear down the wire of the tuner. Our slider in this respect is the only one that can claim this truthfully; besides being made of hard rubber. **Ground through your body by way of the slider impossible.**

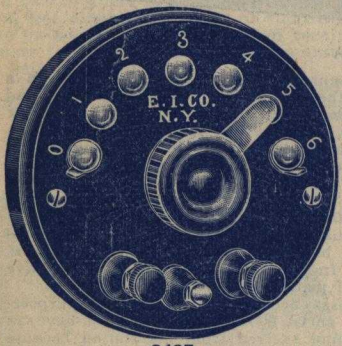
There are four of our famous hard rubber binding posts, which give the tuner that "classy" appearance. Each post is marked. W stands for the wire convolutions; S for slider.

Size of tuner over all, 13 x 7 x 7 inches; weight, 4 lbs.

No. 8486A "Electro Tuner" double slide, as described.....**$3.50**

"ELECTRO" LOADING COIL

In order to receive messages from stations using very long wave lengths it becomes necessary to use a loading coil in order to increase the natural wave length of the ordinary tuning coil or loose coupler.



. 8487

Our new loading coil has a wave length of approximately 5000 meters. If placed in series with either our No. 8486 or No. 9950 tuning coils, or our No. 12002 coupler (in series with the primary) or our "Interstate" outfit it becomes possible to catch time signals from the Arlington Government station using 2500 meters wave length. These stations can not be heard with the ordinary tuner or coupler, as these instruments usually do not go beyond 600 or 800 meters wave length. The use of our loading coil enables one to receive messages from almost any station, no matter what its wave length, up to 5000 meters; the range of your outfit is increased enormously as you can practically receive most any message from any radius.

There are six steps, each switch point representing approximately 800 meters wave length, and by simply revolving the knob most any wave length can be obtained. Of course it must be understood that either a loose coupler or a tuner must be used in conjunction with this instrument **as it cannot be used by itself alone.**

We cannot praise this wonderful instrument too highly and once used you will not do without it. It is made entirely of hard rubber composition with large hard rubber handle and hard rubber binding posts. All metal parts are nickel plated and highly polished; its size is 4" in diameter and 1¼" in height. The diameter of the hard rubber thumb handle is 1". The instrument is furnished in a neat box.

WE GUARANTEE SATISFACTION.

No. 8487 Electro Loading Coil, as described. Price.....**$2.50**

Gentlemen: Jewell, Kan.

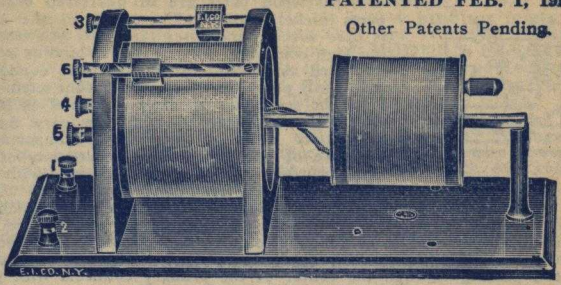
I received the Electro Tuner to-day. It IS ALL IN GOOD SHAPE. IT IS A VERY NEAT INSTRUMENT. You may expect further orders from me. Yours respectfully, EVERETT T. MILLER.

THE "ELECTRO" LOOSE COUPLER.

RECEIVING TUNING TRANSFORMER.

PATENTED FEB. 1, 1916.

Other Patents Pending.



12,002

is the latest word in wireless.

While an ordinary tuning coil is admirably suited for ordinary work it is not a success where exceeding fine tuning is required. In fact even the best tuner cannot tune within 10% accuracy. Furthermore, now when so very many stations are working simultaneously, we must have an instrument which is capable of tuning to an exceedingly fine degree—within 1% accuracy—and furthermore be able to ABSOLUTELY tune out ANY unwanted station.

The loose coupler does this in an astonishingly perfect way and in addition will bring in distant stations 3-5 times as clear and loud.

The new instrument is nothing but a transformer which serves to increase the intensity of wireless signals. At the same time it is the most accurate tuner as yet devised. For this reason the large commercial stations and government stations are using it exclusively now, as it enables them to work "through" other stations.

The loose coupler is not a new invention. It has been known for years, in fact has been used by European governments for two years.

However, the experimenter has been deprived of its use as the cheapest on the market sell at an exceedingly high price making it prohibitive for the average experimenter to procure this useful instrument.

We have been experimenting for long months to produce a loose coupler within the reach of everybody and as usual succeeded. Not alone did we succeed but we improved the old type to such an extent that it has a far greater selectivity than any similar instrument on the market NO MATTER WHAT ITS PRICE.

By means of our new secondary it is possible to "feel off" comparatively few turns of the primary and as each layer (of the secondary) assists the other one, it will be easily understood why we obtain such marvelous results with our instrument, never duplicated before.

Certain far off stations come in quite loudly even if the secondary is pulled clear out as far as it will go, that is the air distance between primary and secondary is fully 6 inches.

We found the connections as per diagram to give best results. The variable condenser is especially recommended and will be of considerable value. Any detector can be used of course. Personally we prefer the "Electro" Lytic Detector as the signals come in very much louder.

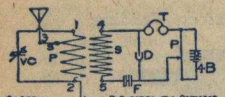
Dear Sirs: Brooklyn, N. Y.

My father bought me a wireless at your place and I think the Electro Importing Co., BEATS THEM ALL. I bought a $15.00 loose coupler OF ANOTHER MAKE, and when I tried it out, the secondary WOULD NOT WORK; so I bought one of YOUR LOOSE COUPLERS, AND I CAN GET CHARLESTON, S. C. NAVY YARD, with a galena detector and a 175 foot aerial, 46 feet high at one end, and 89 feet at the other.

Yours truly, J. EDGAR FERIN.

"ELECTRO" LOOSE COUPLER—Continued

The construction of the "Electro" Loose Coupler is of the highest perfection.



All wood parts are of quartered oak, metal parts nickel plated. The wire on the primary is bare wire wound after the latest process, ensuring high efficiency. 5 hard rubber binding posts are provided as shown. If the variable condenser is not used, post No. 1 remains unconnected.

The secondary is machine wound as it would be quite impossible to wind the very fine wire otherwise. It is of course highly important that no wire of one layer should cover any other, in other words the winding must be done with highest precision only made possible with a special winding machine.

The secondary, projecting from the right has a square tube which slides on the square guiding rod with greatest ease. At the far end a hard rubber knob is provided which serves as a handle to move the secondary back and forth.

We use no sliding contacts to make connections with the secondary, a flexible cord passing through the center of the primary connects with posts 4 and 5. No loose contacts possible.

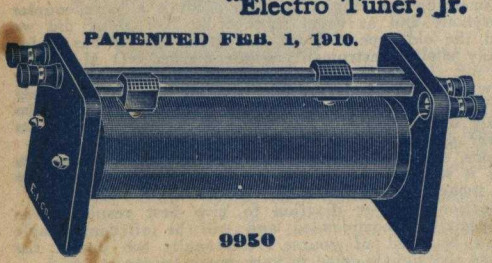
On the primary two sliders are provided with our well known slider used on our other instruments. A stop is provided so that the sliders cannot be moved beyond a certain point. The secondary can be moved back and forth with the greatest possible ease and will not stick, or require two hands to move as is the case with even expensive makes. Our loose coupler is built to pick up wave lengths up to 800 meters and as the majority of commercial and government stations have only a wave length up to 600 meters our instrument will be found to respond in practically all cases.

Adjustment: When connections are made and detector is adjusted, move secondary up to the centre of primary, then adjust slider till signals come in loud; then move secondary back and forth till position is found where signals are loudest. Now the variable condenser is adjusted. Dimensions: length of base 12 inches, width 6 inches, height over all 6½ inches, weight 2¼ lbs.

No. **12002.** "Electro" Loose Coupler with two slides..... **$4.00**

"Electro Tuner, Jr.

PATENTED FEB. 1, 1910.



9950

While the coil previously described may be used to "tune in" for the largest stations, we have had a large demand for a Double Slide tuner of a smaller design, and present our friends with our "Electro Tuner, Jr."

It is wound with about 300 turns No. 24 copper wire, and instead of one slider

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Ithaca, N. Y.

Dear Sirs:

I received your Electro Tuner Jr. last Thursday. IT IS CERTAINLY A PEACH. Now in possession of one I realize HOW VALUABLE AN INSTRUMENT IT IS, FOR A PORTABLE SET, ON ACCOUNT OF ITS SMALLNESS. It may also be used to a good advantage in series with the primary of a loose-coupler.

Yours truly,

M. HULBERT.

ELECTRO TUNER, JR.—Continued.

two are used. This gives a finer adjustment. Our ROLLING BALL Slider is used on this coil. It has 4 binding posts. Those not familiar with the Double Slide Coil are referred to article of Tuning Coil in the June, 1908, issue of MODERN ELECTRICS.

The construction of this coil is the acme of perfection. Coil ends one of molded hard rubber, giving the instrument a beautiful appearance. All metal parts finished in nickel plate.

The Rolling ball touches only one wire at a time and can not possibly wear out the wire. No other coil can claim this. Springs rubbing against the bare wire, as found in other coils, wear the wire down quickly, and the coil must be rewound. This is impossible with our coil. Our's is cheaper at the start, and cheaper in the end.

Sizes, 8 inches long, 3¾ inches high, 3¼ inches wide.

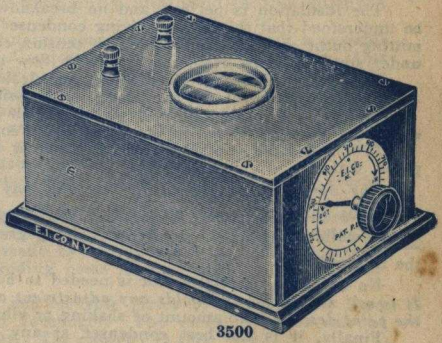
Weight, 1½ lbs.

No. 9950 "Electro Tuner, Jr." (double slide) as described.....$2.00

PARTS NOT SOLD.

The Gernsback Rotary Variable Condenser.

(Patented July 23, 1912.)



3500

One of the most used instruments in the wireless receiving set is the rotary variable condenser, yet, it is strange to note that little attention and experimenting has been devoted to making it more perfect than the existing rotary types on the market using intersecting plates. The rotary plate condensers possess a landslide of faults, which may be briefly outlined as follows: They short-circuit when subjected to a heavy blow or jar; they lose their adjustment after long use and short-circuit; they require constant mechanical attention, often jamming and becoming useless; owing to the air gap of sufficient size by necessity between the plates, the capacity is very low compared to the size; the plates being sharp edged, cause much leakage of the receiving currents with the corresponding loss of range; *cannot be used horizontally* which makes adjustment very crude and tiresome to the operator; and many others which are too well known to mention in this limited space.

We confess that our line of wireless apparatus has failed to be as complete as we desired in the past, for we lacked a rotary variable condenser. Many of our patrons and our competitors wondered why we did not place on the market a rotary condenser using the regular intersecting plates, but we appreciated the

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Stroudsburg, Pa.

Dear Sirs:

I received your tuning coil and think IT IS A FINE ONE.

Yours truly,

C. R. LOGAN.

disadvantages of these condensers, preferring to avoid selling them. Meanwhile we devoted our attention to the solution of the rotary condenser problem, and have evolved a new type, using an entirely new mechanical principle of operation eliminating ALL the defects of the rotary plate type.

As will be seen by the cut of the rotary condenser, the working parts are entirely encased in a neat oak box, finished in the natural grain and highly polished. A large rubber handle is used for manipulating the condenser, while a pointer indicates the proportion of the total capacity in circuit, on a neat scale. Two of our hard rubber binding posts are used on top of the box to make the connections to the receiving set. The apparatus being entirely contained in the oak case, makes the condenser dust-proof.

As for the working parts, it may be stated that these are far simpler than condensers using intersecting plates. The parts work in perfect unison, with no friction or opportunity for wear. It is impossible for the condenser to get out of order in consequence.

Among the many features enbodied in our condenser, we may state the most important as follows:

The working parts do not intersect, and nothing can bind or drop its adjustment.

The conducting surfaces being separated by one-thousandth part of an inch of dielectric material, gives the condenser an extremely high capacity, which is guaranteed by us to be at least *ten times that of any other variable condenser of equal dimensions.*

The insulation is perfect, and no breakdowns possible. However, it must be understood that this is a receiving condenser and not to be used on a transmitting outfit or other source of high tension current. It will not break down under static currents from the air which flow through the receiving apparatus.

No plates with sharp edges being used, leakage is impossible.

Short-circuiting of the condenser is impossible under any circumstances.

The parts being simple and working with little friction or wear, give the apparatus a long life, far in excess of other condensers.

It is fool-proof, nothing being in sight or exposed so that it may be tampered with.

The variable condenser will work in any position. We have made the apparatus with the handle on the side, so that *the arm of the operator may be rested* while adjusting the condenser, giving greater accuracy, and less effort in the manipulation.

No tightening screw or nut is needed to hold the adjustment at one place. *It is self regulating and holds any adjustment after the handle has been left at the point desired.* No amount of shaking or vibration can affect the adjustment.

Finally, it is the best condenser at any price on the market, and you cannot afford to use the others if you wish the maximum efficiency.

As usual we lead—others follow—and copy.

Size, 9½ x 6 x 4⅞ inches. Weight, 2½ lbs. **CAPACITY .01 M.F.**

No. 3500. Gernsback Rotary Variable Condenser (Patented)..... **$4.00**

HAVE YOU subscribed as yet to our famous magazine **"The Electrical Experimenter"?** It is the foremost wireless publication in the world to-day. See the back cover of this catalog.

Brooklyn, N. Y.

Dear Sir:

I have your catalogue on electrical and wireless goods, and I have bought many articles advertised in same. A large part of my wireless station consists of your goods.

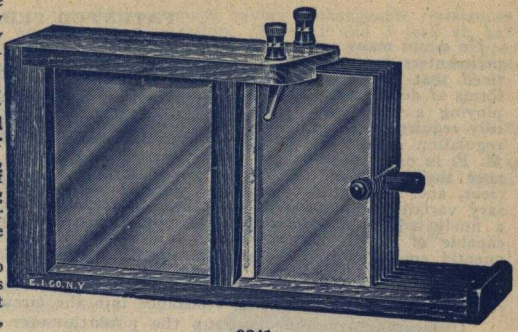
Yours truly,

LLOYD M. KUH.

THE "ELECTRO" VARIABLE CONDENSER.
FOR RECEIVING ONLY.

In long distance work static electricity in the air frequently makes all experimenting impossible. The same effect is produced by trolley lines, telephone and telegraph lines, power houses, arc lamps, etc., in the vicinity of a station. By using a variable condenser all these troubles are eliminated easily.

We would go too far to show diagrams of how to connect variable condensers, potentiometers, tuning coils, etc.



9241

Those not well informed on the subject we refer to the Magazine, "The Electrical Experimenter." Splendid articles containing many diagrams on variable condensers, are frequently published in this splendid magazine.

In wireless telephony it is absolutely impossible to work without a variable condenser. The "Electro" Variable Condenser is of the slide-plate type. Our illustration shows the instrument fairly well, although its beauty can only be appreciated by seeing the article itself.

The case is made of solid one-half inch best seasoned oak, finely polished. We use heavy stock to minimize warping. There are 5 stationary and 4 movable plates. The plates slide in grooves ¼ inch deep and move with surprising ease. The plates approach each other up to 1/16 inch.

It is understood, of course, the nearer the plates come together, the greater the capacity will be.

The stationary plates are connected together, while the movable ones are securely bolted together by a new method, ensuring the best contact imaginable. Contact with the movable plates is made by an ingenious method, which must be seen to be appreciated. Two binding posts are provided on top for connections.

To vary capacity, simply slide out movable plates by grasping the hard rubber handles between thumb and forefinger. The movable plates can be pulled out to clear the stationary ones. The capacity is then zero.

The "Electro" Variable Condenser has a range wide enough for even the finest regulation for stations 1,200 miles apart.

The metal plates are No. 22 B. & S., HEAVILY NICKEL PLATED, all trimmings are well finished. Base has holes to screw down condenser.

The instrument makes a necessary as well as a well appearing addition to any wireless station.

Sizes: 10½ inches long, 6½ inches high, 2 inches wide.

No. 9240 "Electro" Variable Condenser, as described.....**$2.25**

No. 9241 (See cut) with 17 metal plates, 1½ times the capacity of No. 9240; capacity, .0016 microfarad. Price..... **3.75**

Size: 5½ x 11 x 2⅝.

Gentlemen: Monte a, Colo.

Please send prospectus of wireless course, AS I AM A OLD CUSTOMER, and would like to have the set of twenty lessons. I want to say that you have learned me more about wireless telegraphy, than any other company, and I thank you.

Yours truly, DONALD DAVIS.

The "Electro" Potentiometer.

NON-INDUCTIVE.

PATENTED FEB. 1, 1910.

9250

No doubt many experimenters have noticed that nearly all forms of detector employing a local battery require very fine regulation of the E. M. F. in order to secure their most efficient, and satisfactory operation. Several methods for obtaining the necessary variations are now in use, the two principal ones being by means of a finely adjustable rheostat or a potentiometer. The latter, however, is capable of such exceedingly fine adjustment that it is the one most frequently employed in all of the larger wireless stations. The potentiometer differs considerably from the rheostat in the fact that it varies the applied potential (E.M.F) directly, while the latter only causes a reduction of the current by introducing additional resistance into the circuit.

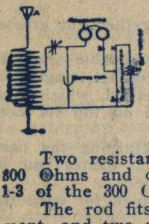
Diagrams for connecting up the potentiometer have been published in "The Electrical Experimenter" as explained under "Variable Condenser," but we show herewith one of the most common connections:

In short, the Potentiometer serves the purpose to vary and regulate the battery current exactly and gradually.

We have been considering the manufacture of a Potentiometer for over two years and the instrument we now offer is the outcome of experiments with over a dozen different styles.

We are willing to prove that our instrument is superior to any other make manufactured now, no matter what its price.

Our potentiometer is the only one on the market which is **NON-INDUCTIVE.** Those who have made a study of wireless telegraphy know how desirable this is for fine work.



Considering the high resistance of the "Electro" Potentiometer, it is truly marvelous that we can crowd up to 1,000,000 Ohms in a thin graphite rod 7½ inches long. The special high resistance graphite rods are extremely hard and only about ⅛ of an inch thick. We have a new process of making these rods and can make them quite cheaply in this size up to 1,000,000 Ohms. We absolutely guarantee the resistance of our rods and will send anybody an instrument free of charge if they can prove that the resistance is lower than stated.

Two resistance rods are furnished with each potentiometer, one having 300 Ohms and one 500 Ohms. For ordinary use only about 100 Ohms or 1-3 of the 300 Ohms rod is used.

The rod fits in a special half-round groove in the base of the instrument, and two spring clips hold the rod at each end securely, besides serving the purpose of making contact.

While the rods are very hard, they would not last long if we were to use a common spring for a slider. Therefore we use our Rolling Ball contact (the same as used on the "Electro Tuner"); this not alone makes absolute contact at all times, but it cannot possibly wear down the rod.

We call special attention to this point. Furthermore this slider works incredibly easy—not in jerks—but absolutely uniform, thus producing a very fine and accurate regulation of the current.

Gentlemen: **Croswell, Mich.**

I have just received my mail order, also Wireless Course. I AM GREATLY PLEASED WITH THE "COURSE." IT IS SPLENDID AND UP TO DATE. I wish to thank you for your kindness and ALSO YOUR PROMPT ATTENTION TO MY ORDER.

Yours respectfully, FRANK J. DOVE.

THE "ELECTRO" POTENTIOMETER—Continued.

The resistance rod can be removed with ease in less than 10 seconds simply by lifting up the spring clips. Another rod is replaced in a few seconds.

Our potentiometer is the only one made having **exchangeable resistances.**

To connect up, we refer to illustration. Posts 1 and 3 lead to battery. Post 3 also is connected with one side of the Detector. Post 2 goes to one side of the telephone receiver, while the other side of the telephone connects with the free post of the Detector to complete the circuit.

Sizes: 10 inches long; 2 inches high; 2 inches wide.

All metal parts finely nickeled.

No. 9250 The "Electro" Potentiometer (patent pending), as described .. **$1.25**

Extra Resistance Rods, each ..... .50

NOTE.—Rods can be furnished only to users of the Potentiometer. Other parts are not sold.

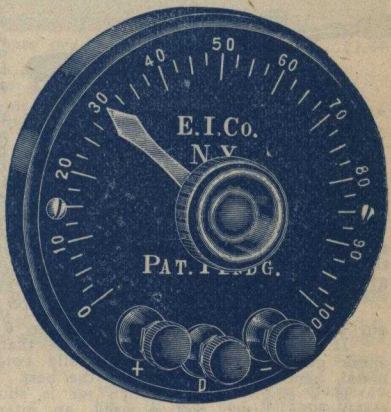
"ELECTRO-CIRCULAR" POTENTIOMETER

(non-inductive). Patented Feb. 28th, 1911.

During the past two years we have had so much demand for a circular potentiometer that at last we have decided to place one on the market and present herewith our new type, which we are sure will find instant appreciation by our many customers.

There are several unique features incorporated in our new instrument which above all takes up a minimum of space being only 4 in. diameter, the thickness of the main body being only 5/8 in.

As in our No. 9250 straight potentiometer, we use in our new instrument a high resistance, carbon-graphite rod and the resistance of this instrument is the same as that of our No. 9250, namely, 300 ohms, inasmuch experience has taught us that for wireless use only about one hundred to two hundred ohms is generally used, we do not furnish extra rods for this new instrument and 300 ohms will cover all the wants of the operator and experimenter. The most important part is that the movement is rotary and not straight on a long rod, as used in our other instrument. It will be realized that this is a great advantage, inasmuch as the rotary movement for wireless instruments comes into force more and more every year. The adjusting knob carries a pointer which moves over an empirical scale which is a great advantage to the operator as he will always know just how much current to give his detector and will easily remember the proper regulation.



9255

All the insulating parts of the instrument are made of molded hard rubber which makes it the most attractive apparatus of this sort ever placed on the market. There is nothing to shrink or warp on this instrument and the construction is beyond criticism. You could not buy a better potentiometer even if you paid ten times the price we are asking for it. The connection is positive

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Gentlemen: Oakland, Cal.

The circular potentiometer for which I sent HAS ARRIVED O. K. I have it working on my receiving box today and IT IS ALL TO THE GOOD. My electrolytic detector is giving GREAT RESULTS; BETTER THAN IT EVER DID BEFORE.

I think that this new potentiometer is the GREATEST THING YOU EVER TURNED OUT.

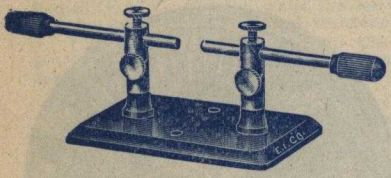
Yours very truly, E. W. STONE.

and it is quite impossible to have any loose connections. The instrument is always ready and there is nothing to wear out or to be replaced. The carbon-graphite rod is embedded in the hard rubber and it is quite impossible to break it even if the instrument should be dropped. Three of our well-known hard rubber binding posts are provided on this instrument. Also two nickel plated screws to attach the potentiometer to table, wall or an instrument board. The potentiometer is nickeled and polished. The scale is molded into the hard rubber. The diameter of the rubber thumb handle is 1 inch.

Size over all 4 x 1½ in.; weight four ounces. WE WILL REFUND YOUR MONEY IF THIS INSTRUMENT IS NOT ALL WE CLAIM FOR IT AND IF IT IS NOT SATISFACTORY IN ANY RESPECT. Connections are the same as for any potentiometer. Instrument is shipped ready for instant use.

No. 9255. "Electro-Circular" Potentiometer (patented).....$2.00

The "Electro" Zinc Spark Gap.



9220
On Composition Base.

We have placed on the market a good many articles during the past, but we pride ourselves that our little "Electro" Zinc Spark Gap, for efficiency, neatness, simplicity and low price, stands unequaled.

While our No. 1111 set of "Electro" jump spark balls are best suited for short distances, for which purpose they are so far unmatched, the "Electro" Zinc Spark Gap is intended to do real hard work—even commercially for distances as great as 150 miles.

The peculiar properties of a small zinc spark gap make it particularly efficient for sending, especially when a sending condenser is used. While the spark balls—having a capacity themselves—do not need aerial and ground for short distances, the Zinc spark gap throws all the energy upon the antennae from which it radiates into space most powerfully.

Our new Zinc Spark Gap is used of course in the same manner as our spark balls. Any size coil up to 6 inches can be used successfully.

It has been found in the past that if zinc is used in the sending spark gap, same will transmit fully twice as far as brass or any other metal, hence, as usual, we use the best.

If a single small Leyden jar is shunted across the gap and if, for instance, a 1-inch coil is used, an intense blue mass of fire will crash across the gap with a deafening roar—exactly like you hear it in the large commercial and government stations. If you never saw our Zinc Gap in operation, you will hardly realize its power.

Besides, it may also be used as an

ANCHOR GAP

in the antennae, which serves as an automatic switch. (See article on 2-mile Wireless Station in the July, 1908, issue of "MODERN ELECTRICS.")

The "Electro" Zinc Spark Gap has two zinc rods 3-16 inch diameter, and 2½ inches long, having a hard rubber handle at one end, making it possible to adjust the gap while sending. Stands which are finely nickel plated are mounted on heavy hard rubber composition base. Size of base 2 x 3½ inches.

No. 9220 "Electro" Zinc Spark Gap, as described.....$0.60

Dear Sirs: New York City.

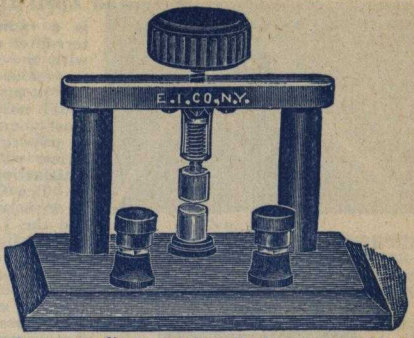
I received the spark gap O. K. AND WAS VERY GLAD OF YOUR IMMEDIATE ATTENTION TO THE ORDER.

Thanking you very much, I am,

Yours truly, H. LOREA.

"ELECTRO" AJUSTABLE ZINC SPARK GAP.

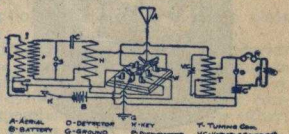
This Spark Gap, ever since its introduction in 1909, has found much favor among wireless people. This Gap is a marvel of simplicity and must be seen in action to be appreciated. It has heavy zinc plugs, ¼ inch thick, which makes it possible to use the Gap on a ½ K.W. transformer, and with our ½ K. W. transformer coil. Size of base: 4½x2½ in. Finely polished hard rubber pillars, hard rubber binding posts and thumb screw (1 inch in diameter). Metal arch is of special hard aluminum, ¼ in. thick, finely lacquered. The adjustment is extremely accurate. Gap is to be adjusted while IN OPERATION.

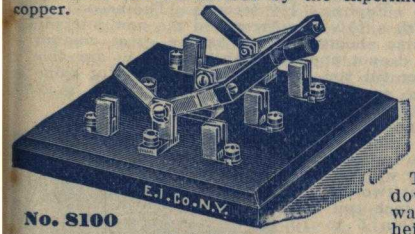


No. 9220a. Zinc Spark Gap, patents pending, as described.....$1.00

THE "ELECTRO" ANTENNA SWITCH.

This switch has been brought out in pursuance to a great many calls we have had in the past for such a switch. As illustration shows this is a three-pole, double throw switch. As will be seen the throw to change the switch over is only about 1 inch, making the throw almost instantly. The two end prongs are at an angle of 140 degrees and the construction of this switch is unlike any other. By referring to the diagram it will be seen that when the switch is thrown for receiving the primary of the coil is disconnected. If accidentally the sending key should be touched it will be impossible to damage the receiving instruments, as the coil can under no circumstances operate. The diagram shown is standard, but of course many other connections can be devised by the experimenter. All metal parts are pure copper.





No. 8100

Hard rubber handle is provided as switch handle. This switch will stand the discharge of a 4 inch coil without jumping across. It can be used in connection with a transformer up to 5 K. W. All copper parts are an eighth of an inch thick. Binding post is provided at each pole of the switch.

The switch can be screwed down on any table or on the wall. Size of base 7 x 7 inches, height over all 4 inches, when lever is down; when lever is up, height is 5 inches. This switch is built thoroughly all the way through, best material used and construction is right. There is at the present no quicker wireless throw switch on the market. We will refund your money if it is not absolutely satisfactory.

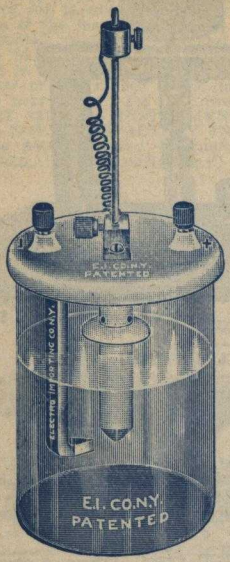
No. 8100. "Electro" Antenna Switch, as described, price.....$2.00

Gentlemen: St. Louis, Mo.

I am building a wireless set, both sending and receiving. I am using your zinc spark gap and spring binding posts, AND FIND ALL YOU CLAIM.

Yours respectfully, R. NEWBY.

THE GERNSBACK ELECTROLYTIC INTERRUPTER.
Patented April 4th, 1911.



No. 8000

is a radical departure in electrolytic interrupter manufacture. It was constructed with the view to stand great abuse, give marvelous results and to be ridiculously low in price. Heretofore such interrupters could not be had under $15 to $20 and most young experimenters who did not care to pay this sum had to go on using batteries, which only cause trouble and dissatisfaction.

The Gernsback interrupter is connected in series, with any ordinary spark coil and the 110 V. or 220 V., direct or alternating lighting current supply. No resistance or condenser is used, except a key or switch to break the current in the usual manner. The vibrator of the coil must be screwed up tight as it should not vibrate. The glass vessel is filled with the solution (formula furnished only with interrupter), and as soon as the key is depressed you will get the surprise of your life. You don't get a thin, meagre spark, as with batteries, but A HEAVY FLAME ¼ INCH THICK. That this is the ideal thing for Wireless is unnecessary to mention, The spark obtained of a 1-inch coil, connected to a big sending condenser and a zinc spark gap with zincs ½ INCH THICK will crash in the gap with such a tremendous noise that it will take your breath away AND THE SPARK FILLS THE GAP. These are PLAIN FACTS. Our usual guarantee backs them. By way of proving our statement look at the two photos taken by Mr. Gernsback. The first one shows the full spark of a 2-inch coil run by a 6 V. 60 A. H. storage battery. Exposure 1½ seconds. The second shows the FLAME of the same coil with a 110 V. current and the new interrupter. Exposure 1½ seconds. The flame shoots upward, as the great amount of heat raises the discharge. You cannot appreciate the work you are able to do with this wonderful interrupter till you see it in operation. Not alone do you get a better and a heavier spark, but it is also from 15% to 25% LONGER, all depending on the construction of the coil.

And that is not all. The output of the coil is increased at least 60%. That means that you can send at least 60% further with the Gernsback interrupter. This will be better understood by mentioning that two No. 14 copper wires, connected to a 1 inch coil and separated ¼ inch will fuse within 5 to 10 seconds.

The Gernsback interrupter starts with 50 volts. A metal rod of especial alloy goes through the cover down in the porcelain tube. This tube at its lower end has a peculiar aperture in which the point of the rod fits.

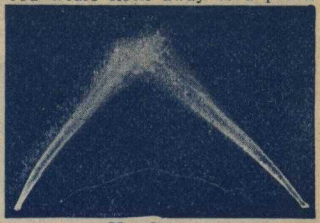
No. 1

Dear Sirs: Canterbury Vent, England.

The "GERNSBACK" Interrupter duly received, and I am VERY WELL PLEASED WITH SAME.

Yours very truly, A. V. HUGHES.

The tube at the upper end has a screw top which screws in the cover. This tube is made of special material and will not crack even if the interrupter is worked steady. In operation the metal rod wears itself away to a point. The rod itself is fed down by gravity. This action is entirely controlled by the weight attached to the top of the rod (see cut). In fact, the entire success of this interrupter lies in the right weight of the metal weight. Too much weight gives no spark at all; too little gives an uneven and unsteady spark. Very little metal is used up; it takes about 60 hours' constant work to consume one inch of the rod. New rods are supplied at a trifling cost. The rod can be left constantly in the solution



No. 2

The porcelain cover has all metal parts IMBEDDED in it (Patented). No metal exposed whatsoever. Therefore NO CORROSION as is usually experienced in other interrupters. The binding posts are of hard rubber, therefore do not corrode, nor can they become short circuited accidentally, nor shock you.

The interrupter heats up very little even when working for hours. The path between the two electrodes is only ¼ inch and the amount of solution heated at a time therefore is necessarily very small.

This interrupter will find thousands of friends and is especially recommended for wireless and X-ray work. When used for the former it may be stated that it produces an extremely high sound in the distant receiver, which is much easier to read than the low sound produced with the old spring vibrator giving only from 150 to 200 interruptions per second, against 5,000 to 7,000 per second with the electrolytic interrupter.

The interrupter is to be used in connection with ordinary spark coils from ¼ inch up to 12 inch spark length.

Two coils (or more) may be connected in series and if the secondaries are connected in series too, the length of the resulting spark is as long as the spark of the two coils put together. Therefore, two 2-inch coils will give a 4-inch spark and so on. Ordinary vibrator coils can not of course be connected in series, as each vibrator working independently will oppose the other, the consequences being that the spark length is cut down.

With the electrolytic interrupter a plurality of coils work as one, as the pulsations from the interrupter flowing through all the primaries (connected in series) magnetize and demagnetize the primaries all at the same time. The result, therefore, is that each coil acting in unison with the other (or others) will add its output to the other (or others). The longer spark is the result. Another important feature is as follows: If we connect two Gernsback interrupters in series and then operate the coil, we find that the spark length of the coil is DOUBLED. Therefore, if anyone owns, for instance, a 2-inch coil he will obtain a 4-inch steady spark from same, when using 2 interrupters.

OPERATION.

First fill the glass jar with the solution (to be obtained from any druggist) so that it stands 4 inches high in the glass. Put the cover on jar and pass the rod through the cover down in the tube. Be sure that its point fits in the aperture at the bottom of tube. The weight is then attached to the rod as shown in cut.

The thumb screw of the metal bridge on top of cover is left loose.

Now connect the interrupter as shown in diagram. If the current is direct the positive pole of the current must be connected with the post marked +. If the current is alternating it does not make any difference how the wires leading to interrupter are connected, since there is no positive nor negative pole.

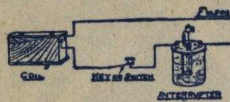
Gentlemen: New York City.

Received the goods O. K. and am VERY MUCH PLEASED WITH THEM. Thanking you for your kind attention, I am,

Yours truly, EDGAR PETERSON.

The interrupter works on direct and alternating current.

The Gernsback interrupter consists really of two interrupters in one. If we lift the rod up about ¼ or ⅓ inch so that the rod is no longer in the lower hole and clamp it tight by means of the thumb screw in the bridge of the cover, the interrupter will work, but the spark is much shorter; on the other hand, it is much heavier and more vigorous. The solution tends then to mount in the tube and will flow out from the overflow.



A switch block with fuses should always be used with the interrupter. It is much better to blow out a fuse than to damage the coil or interrupter if the current should get too strong, or if the tube in the interrupter should accidentally become fractured, which would short circuit the line.

Every instrument is fully guaranteed to be all we claim for it. Mr. Gernsback would not allow his name put to it if he had not implicit faith in it. It is a guarantee by itself.

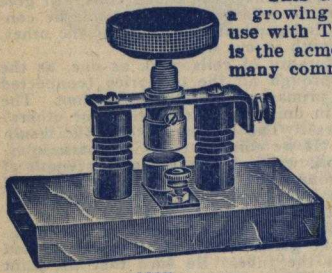
THE GERNSBACK INTERRUPTER No. 8000, as described, size 10½x5 inches ..... Price $2.25

No. 8000a.	Metal rods for Gernsback Interrupter..... Each	$0.15
No. 8000b.	Interrupter tube	.30
No. 8000c.	Interrupter jar, 4½"x6½", each.....	.20
No. 8001.	D. P. S. T. Switch block with two 10 A Edison fuses...	.45
No. 8002.	Cotton covered double cord, lamp Cord, per foot.....	.1½
No. 8003.	Attachment plugs, fits any lamp socket.....	.15
No. 8004.	Extra Edison fuses	.05

Note.—Parts to this Interrupter NOT SOLD, only to owners of the Interrupter for repairs, etc.

Note.—This Interrupter does NOT work our closed core transformer, but only open core transformers, such as our **No. 8050.**

"Electro Commercial" Spark Gap



9225.

This Gap has been developed by us to supply a growing demand for a heavy spark gap for use with Transformers from ½-5 K. W. This Gap is the acme of perfection and is used by a good many commercial companies all over the country. The uprights are of special fibre. The adjusting knob is of hard rubber. The base is of marble. Size of base 5½x3 inches. Diameter of zinc plugs ¾ inch. Diameter of adjusting knob 1⅞ inches. The adjustment itself is micrometric, and the plugs are brought together very gradually. Large binding posts for connections are provided. Weight of complete Gap is 2 lbs. We guarantee this gap to be the equal of any high grade spark gap, no matter what its price.

No. 9225 "Electro Commercial" Spark Gap..... $3.60

PARTS NOT SOLD.

Waynesboro, Pa.

Dear Sirs:

I received goods and I want to thank you for your kindness for looking after it.

Hoping to give you more orders in the future, I remain,

Yours truly, HALL JONES.

THE "ELECTRO" ¼ K. W. TRANSFORMER-COIL.

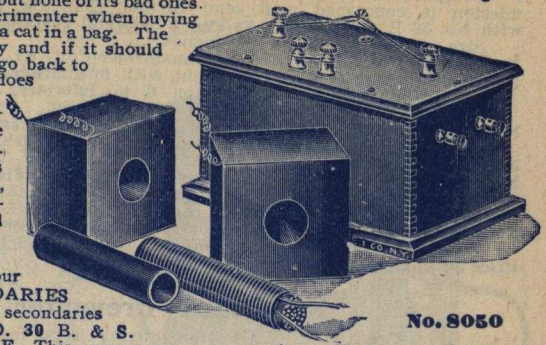
(100 MILE WIRELESS COIL.)

is a radical departure from ordinary coil building. It possesses all the good points of a good coil, but none of its bad ones.

The average experimenter when buying a coil nowadays buys a cat in a bag. The coil is sealed entirely and if it should break down it must go back to the factory. Neither does the owner know what is inside of the coil—he must take the maker's word for it.

Our new coil is **NOT SEALED IN,** and is still better insulated than a sealed in coil.

Our new Departure is centered in our **BLOCK SECONDARIES** (see cut). These secondaries are wound with **NO. 30 B. & S. ENAMELED WIRE.** This means, on account of getting 3 times as many ampere turns into a given space, that our secondaries are 3 times as efficient as other ones, and that they take up one-third as much room. Size of secondary, 3½x2¾x3½ inches.



No. 8050

You marvel that such a small coil could give such an enormous output. The enameled wire explains the mystery. After the secondary coils have been wound they are placed in a square box which is filled with molten paraffine. When cold, a square block-coil is obtained, which exposes no wire except the 2 end pieces.

We form our secondaries square so they can not roll. Each secondary weighs 2¾ lbs. and gives a 1-inch spark.

The primary is wound with Double Insulated Copper Wire No. 14, B. & S.

A hard rubber insulating tube is slipped over the primary. Then the two block secondaries are slipped on and the whole is placed in the coil box, which has been treated with an insulating compound.

All coils fit perfectly close and snug and the box is arranged in such a way that the secondaries can not move, but are always ¼ inch apart.

Connections are made and the cover is screwed down. Thus this marvel of simplicity is always ready to be inspected and to be taken apart, when occasion arises, for new experiments, etc., etc.

Four top rubber binding posts are provided, so that one secondary may be used at a time, **both in series, both in parallel and for other important experiments.**

BY CONNECTING IN MULTIPLE RANGE IS GREATLY INCREASED.

As there is no vibrator nor condenser to this coil, it must, of course, be used with our electrolytic interrupter by running it from 110 Volts Alternating current, or 110 Volts Direct current.

The spark obtained is from 1 to 1½ inches, but ¼ inch THICK. For wireless work it is the fat spark that counts, not the long, thin spark. You must radiate (amperage) from your antenna, not tension (voltage).

Here is an UNSOLICITED testimonial:

Electro Importing Co. New Orleans, La., Jan. 11, 1911.

Dear Sirs: It may be of interest to you to know, that I communicate with a friend in Baton Rouge every night with my One-half K. W. Transformer Coil, a distance of about 70 miles air line. My coil is working excellent, and anyone wishing to buy a coil, cannot make a better move than by purchasing one like mine. Hoping this will be good news, I remain, Very truly yours,

BERNARD OPPENHEIM, 1435 Henry Clay Ave., New Orleans, La.

Gentlemen: **Buffalo, N. Y.**

I am VERY MUCH PLEASED with your ½ K.W. Coil No. 8050. I have SENT 48 MILES UP THE LAKES TO THE CITY OF ERIE a boat equipped with the Clark Wireless system. The operator said I CAME IN AS LOUD AS C.H., THE PORT HURON STATION, (10 K.W.).

Yours truly, H. SCHOEFFLIN.

Our coil radiates energy—high amperage—and lots of it.

Compared with the ordinary coil, ours as far as wireless transmission is concerned, will send further than the 8-inch coil wound with No. 36 B. & S. wire. And an 8-inch coil costs $88.50 ! !

Size of box, 9 x 5½ x 4½ inches.

No. 8050. Electro ½ K. W. Transformer-Coil, as described.. $8.00

No. 8060. Same coil as above, but with fine vibrator and condenser, to work on 6 to 10 volts (100 watts equal to 20 miles). Price..... 10.00

No. 8080. Block-Secondary wound with No. 30 Enameled wire, as described. Price .....each 2.75

No. 8081. Hard wood box. Price.....each .60

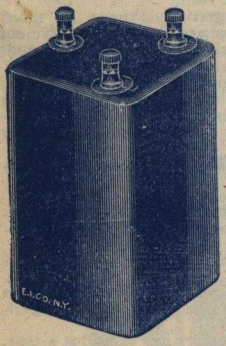
No. 8082. Primary, with Enameled wire (1½ in. diam.). Price each 1.50

No. 8083. Hard rubber primary tube for No. 8082,.....each .25

No. 8084. Large Hammer vibrator as used on our 8060 coil, very large model. Also used on our 6 inch coil.

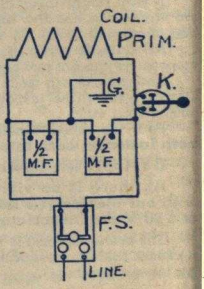
Price of complete vibrator.....$3.25

Kick-Back Preventer.



1718

All transmitting sets in Wireless stations, employing commercial light or power circuits for the source of energy, are required to properly protect the circuit against Kick-backs from the spark coil or transformer. To this end, the Fire Underwriters require that two, one-half micro-farad, fixed condensers, be connected in series across the primary circuit, supplying the transformer or spark coil. The centre connection between the two condensers is to be grounded to a good damp ground connection, as in cut, or to a water pipe, on the street side of all meters, etc. The ground wire should be run on insulators, and be of the same size as the primary leads of the transmitting set. The proper capacity condenser has been developed by us, and is very compact and efficient. It is made of heavy tin foil and a good dielectric; the enclosing case being of glass. The condensers are then sealed in a high grade sealing compound giving a superb insulation, that cannot be surpassed. Get one of these condensers to-day, and have your station protected according to the Underwriter's rules, before you get into trouble.



Size, 3¾ x 4 x 6 inches.

No. 1718 Kick-back Preventer, as described. Price.....$2.00

Kenosha, Wis.

Dear Sirs:

Received order in good condition and thank you very much for the PROMPT ATTENTION given.

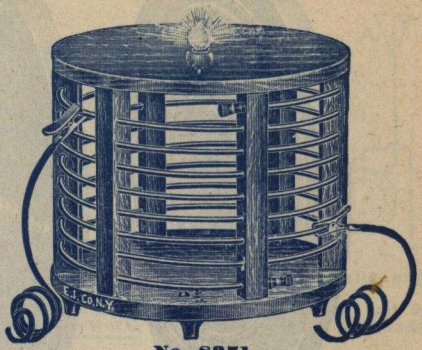
Yours truly,

R. T. ARMSTRONG.

"Electro" Sending Helix

With Pilot Lamp Device.

This is something new in helices, and although we have been making a similar helix for the past year, our No. 8270B which in our catalog lists for $10, we have had so much demand for same that we decided to build a lower priced one, improved in several ways. The new 8271 Helix is built entirely in SOLID MAHOGANY throughout, (no imitation mahogany.) There are eight turns of No. 6 B & S Aluminum wire, two fine helix clips with several feet of best imported Pirelli cable. Hard rubber binding posts for the two other connections, are provided.



No. 8271
LAMP FOR PILOT DEVICE SOLD EXTRA

The new departure, however, is found in the PILOT LAMP device. This unique feature is original with us and has never been offered by any other concern. "AS USUAL WE LEAD." The pilot lamp has NO METALLIC CONNECTION with the helix, as the lamp lights only by the inductive effect of the helix. A loop of wire fastened under the top board connects directly with the lamp. This loop is fully 2 in. away from the helix spiral.

Instead of using a hot wire ammeter, the pilot lamp is used, and when the lamp lights up brightest you know that you are radiating the maximum amount of energy.

We do not furnish a lamp with the helix, as any small incondescent lamp, Carbon, Tantalum or Tungsten, may be used. We furnish a socket which takes ONLY miniature base lamps.

A lamp is not furnished as for each different coil, a different voltage lamp is used. With a 2-inch coil use a 2-4 volt lamp. With a 3-inch coil or ¼ K.W. coil or transformer use a 4-6 volt lamp. With a ½ K.W. transformer use a 10-16 volt lamp. Inasmuch as it depends all on the coil or transformer used; each helix should be tried with various voltage lamps till the right one is found.

This helix is without a shade of a doubt the finest made in the country and fills a long felt want. Sizes are: 10 in. diameter, 9 in. high; thickness of wood is ½ in. Weight, 2¾ lbs. This helix can be used for coils from 1 inch up to ½ K.W. transformers and will add considerably to the efficiency of any wireless station.

No. 8272. "Electro" Sending Helix as described.....$6.00

PARTS NOT SOLD.

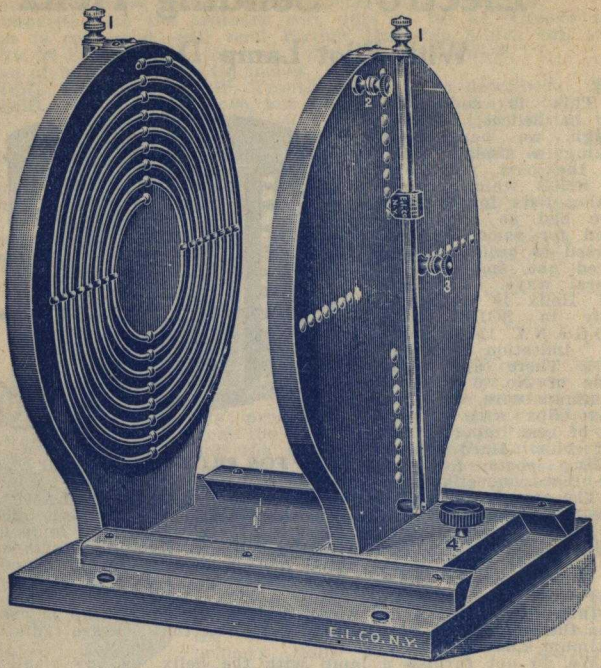
Effingham, Ill.

Dear Sirs:

We received your order and were VERY MUCH PLEASED WITH IT.

Yours respectfully. McCOY AND AUSTEN.

The "Electro" Commercial Oscillation Transformer



No. 9600

This instrument fills a long felt want among amateurs and has been designed to be used with power up to ½ K. W.

Now that the Wireless situation is clear and we know that the amateur may use a wave length up to 200 meters, we thought we could do no greater favor to the American amateur than build an apparatus which would confine the wave length to 200 meters, and at the same time obtain high efficiency. In connection with a four-wire aerial, total length of fifty feet with any transformer up to ½ K. W., **a wave length of not more than 200 meters will be sent out.**

Knoxville, Tenn.

Dear Sirs:

I received order today in good condition and am pleased with YOUR PROMPTNESS IN ATTENDING TO SO SMALL AN ORDER.

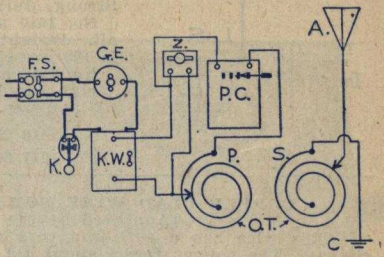
Very truly yours,

ST. JOHN REYNOLDS.

ELECTRO COMMERCIAL OSCILLATION TRANSFORMER

(Continued)

The adjustment of this apparatus is the most complete that could be thought of. There are two spirals of solid No. 6 Aluminum Wire, each spiral having eight turns. The two spirals can be separated by moving the spiral on right back and forward, the maximum separation being 10 inches.



We use no helix clips of any kind, but the adjustment is made by means of a slider mounted directly on the back of each spiral. By means of these sliders—adjustments which vary the inductance to a half turn, are readily accomplished. This feature cannot but recommend itself and has never been attempted before in any other similar instrument. By means of the handle 4, the movable spiral can be adjusted back and forth, which assures practically any adjustment that may be wanted.

This apparatus is especially recommended for close tuning and is invaluable for Wireless Telephony work, where it positively stands unequalled.

The construction and general execution of the apparatus is of the highest order and stands distinctly by itself.

The wood is cherry throughout, mahogany finish, hand rubbed polish, ⅝ inch thick.

The Oscillation Transformer is shipped flat and takes up but little space when shipping.

The full size of the instrument is 16x14x12 inches; weight 8¾ lbs. All metal parts are brass nickel plated, except the Aluminum Wire.

There are six generous nickel binding posts. The Aluminium wire spirals are fastened by a unique process, never attempted before. The whole instrument will make a valuable addition to any wireless station.

We positively guarantee the working efficiency and wave length of this instrument and will cheerfully refund the purchase price if not entirely satisfactory and equal to our description.

No. 9600 "ELECTRO" COMMERCIAL OSCILLATION TRANSFORMER as described $10.00

Wireless Lightning Switches

The Underwriters' Rules in most of the cities now call for lightning switches, wherever aerials are erected on top of buildings, residences, etc.

1616

The rules prescribe either 250 or 600 volt, single pole, double throw switches, which must be fastened outside of the building. A No. 4 B. & S. wire is specified in all cases, to run from the aerial to the switch and thence to the ground, on the outside of the building.

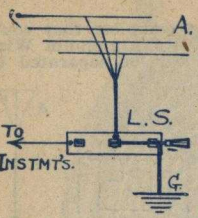
Waltham, Mass.

Dear Sirs:

The one-inch Spark Coil has been received, AND IS GIVING GOOD SATISFACTION.

Respectfully yours,

WESLEY R. GILBERT.



Thus the aerial should always be grounded when not used, to protect the house from lightning. Connecting diagram is given herewith.

Our switches are of the standard type. All metal parts are of pure copper, base is slate. Strong, durable handle is furnished.

No. **1616** measures 14 x 2½ x 3 inches over all. Weight is 3½ lbs. Its carrying capacity is 100 amperes.

No. **1617** measures 17 x 3 x 3 inches over all. Weight is 5¼ lbs. Its carrying capacity is 100 amperes.

No. **1616** 250 Volt Lightning Switch **$2.25**
No. **1617** 600 Volt Lightning Switch.. **3.00**

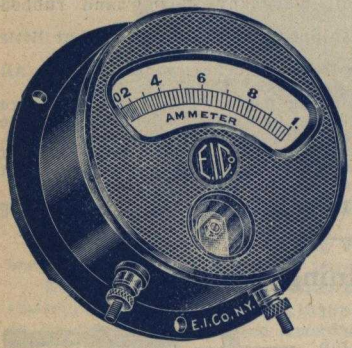
COPPER CLAD WIRE FOR LIGHTNING SWITCHES.
(Approved by the Underwriters.)

This wire has a soft iron core while the outside is pure SOLID copper. The copper forms about 1-3 of the entire wire.

Two sizes carried only. No. 4 and No. 6 B. & S. No. 4 has 9 feet per lb. No. 6 has 13½ feet per lb.

No. **4004** Size 4 B. & S. soft copper clad wire, per lb. **$0.29**
No. **6006** Size 6 B. & S. soft copper clad wire, per lb. ..... **.29**

The "Electro" Hot Wire Ammeter



9100

This instrument registers up to 1 ampere and is connected direct in series in the aerial. The greatest deviation on the ammeter shows the greatest amount of energy radiated by a Wireless set in connection with which this instrument is used. **The hot wire ammeter is the only instrument devised, whereby you can ACCURATELY tell when your station is radiating the greatest amount of energy.** Our new meter is fully jewelled and high grade in every respect.

The instrument is encased in heavy cast iron case with heavy cast iron base. The meter also has an adjusting thumb screw at the top by which the pointer can be correctly brought back as the temperature change varies the reading of a hot wire ammeter more or less.

Diameter of instrument is 4½ inches, height 2 inches, weight 1½ lbs. Finish is beautifully oxidized and the instrument will make a superb addition to any station. This meter is a Commercial one and is used in Commercial stations.

No. 9100 "Electro" Hot Wire Ammeter, Price..... **$6.85**

Gentlemen: **Louisville, Ohio.**

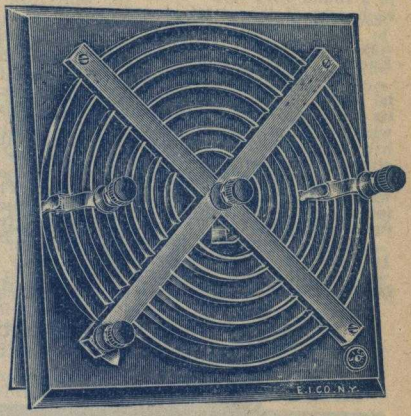
The goods which I purchased from you ARRIVED ALL O. K. The Spark Coil DESERVES PRAISE. I intend sending you an order in the near future. Will you please send me a catalogue, giving prices on all wireless goods. **Respectfully, SANFORD ESSIG.**

The "Electro" Sending Helix.

(Patent applied for.)

A Sending Helix, better known under name of Transmitting Tuning Coil, as its name implies, is used to tune the sending end. What the receiving tuning coil is to the receiving station, the sending Helix is to the sending station. In other words, by means of the sending Helix one can change the wave length of the station at liberty. This is quite necessary when different stations work at the same time in the vicinity and when one does not want to interfere with the others. It is, of course, easy at the receiving end to "tune in" and to tune the other stations "out."

The usual connections are shown on the next page. It is, of course, necessary to use the adjustable condenser with the sending coil. By changing position of helix clips, more or less inductance is put in the circuit, with a corresponding change of the wave length.



9270

Very interesting phenomenae can be performed with our Helix, especially in impedance. By connecting a 6-volt lamp between A and B, at two certain points to be found by experiment, it will light up brightly, even on a 1-inch coil, notwithstanding that the connections are made **on a single piece of brass strip** which seemingly short circuits the lamp.

Quite powerful sparks can be obtained by short circuiting a piece of the brass strip one inch long on the helix.

We departed from the usual construction of sending inductances which are built on the principle of our "Electro Tuners," that is, a heavy wire wound in convolutions either around a core, or supported by itself.

Such inductances are very unhandy, because they are not only quite inaccessible at some parts of the convolutions, but they take up too much room.

The "Electro" sending Helix is built with great ingenuity, EVERY INCH OF THE INDUCTANCE IS ACCESSIBLE TO THE CLIPS, a feature never realized heretofore in any sending inductance. You do not have to twist your arms out of shape to reach a certain part of the helix; it is built IN A PLANE and is the most convenient and quick-to-operate helix ever invented.

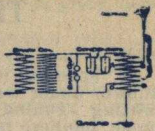
Dear Sirs: **Los Angeles, Cal.**

I am at present using several E. I. Co.'s instruments. I FIND THEM ENTIRELY SATISFACTORY. I have received a DISTANCE OF 2000 MILES, USING E. I. CO. PROFESSIONAL PHONES. HAVE TRANSMITTED 115 MILES, using a ¼ K. W. Trans. (home made) in connection with one of your LITTLE "ELECTRO" BRASS RIBBON HELICES.

Yours Truly,

K. G. ORMISTON.

THE "ELECTRO" SENDING HELIX—Continued.



For efficiency it is unequalled. The inductance of our Helix is almost twice as great for the same size as in any other kind. Each part of the spiral increases the inductance in the adjacent part of the spiral, on account of the flat face of the brass strip; the effect is naturally greater than in a round wire coil. There is only ½ inch space between each part of the spiral in our apparatus.

The "Electro" Sending Helix adds as much as 600 ft. wave length to an aerial if operated by a 1½-2 inch coil. Even ¼ inch piece of the Helix changes the wave length considerably.

The construction, as seen in illustration, is simple. The brass strip is wound in a groove on the heavy oak board, which has a support at its back, arranged so that the board stands at an angle of about 60 degrees, which is best suited for quick operating. Our inductance takes up very little room and as it stands vertically it is much easier to handle than circular inductances. The clips grip the brass strip thoroughly and have INSULATED HANDLES, making it possible to change the inductance while the spark coil is in operation. This is a new feature and is not found in other sending coils. Two such clips with flexible cords are furnished with the "Electro" Sending Helix.

The apparatus is finely finished and has in addition two binding posts. It looks like business and acts it!

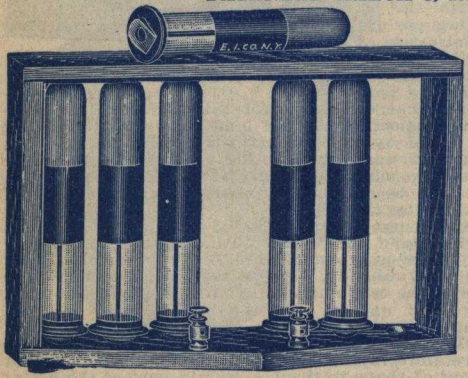
Size of board, 7x7 inches.

9270 "Electro" Sending Helix, as described **$1.50**

Parts NOT Sold.

The "Electro" Adjustable Condenser.

PATENTED MARCH 8, 1910.



9260

[For Sending.]

It has long been known that by connecting Leyden jars (a capacity) across the spark gap, the sending radius of a station could be increased enormously.

The waves sent out from the regular spark gap die out very fast (Fig. 1), while the waves emitted from Leyden jars set up oscillations of a much longer duration (Fig. 2), besides being considerably more powerful.

The latter is easily proved by connecting our Adjustable Condenser across the spark gap. Ordinarily the spark in the gap has a reddish-violet color. The noise produced by the spark is little.

Now connect our condenser across the gap and you immediately notice an intense blue mass of fire. The noise even on a ⅜-inch coil is loud enough to be heard one-half block away, while the noise from a 1-inch or 2-inch coil can be heard for blocks. In fact, it "means business," and sounds like business.

Elizabeth, N. J.

Dear Sirs:

I received my order and AM PERFECTLY SATISFIED.

Yours very truly,

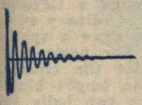
EDWARD C. LANDWEHR.

THE "ELECTRO" ADJUSTABLE CONDENSER—Continued.

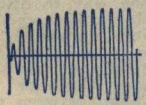
A 2-inch coil, in connection with our Adjustable Condenser and our Sending Helix rivals a good many commercial stations, and can be used as such.

The "Electro" Adjustable Condenser is truly a marvel of simplicity and efficiency. No condenser was ever built in this manner and we have devoted all our energy to produce an excellent article in reach of everybody. Our Condenser is not alone used in Wireless, but in Tesla experiments; in fact, in all high tension work, to adjust capacities, etc.

A complete Condenser comprises the stand or frame and six best imported Leyden jar condensers in which only glass free of all traces of lead is used. Leakage absolutely impossible. The novel part, however, is that each jar has a spring clip at the top, and as the stand has at the top circular recesses, and at the bottom small round metal knobs, the jar is snapped into its position in less than a second. It snaps out simply by pulling or pushing the jar.



1

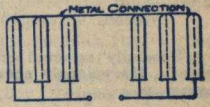


2

NO CONNECTING WIRES, NO SCREWS USED WITH JARS.

Good connections at ALL times. The jars cannot fall out, no matter in what position.

THE BEST PART, however, is that you do not have to buy a complete stand with 6 jars. You can start with the stand and 2 Leyden jars, and add more as you need them. If this is not furthering your interests we know of nothing that is. To change or vary the capacity of your circuit, simply snap in or out more or less jars, till best results are reached.



In the whole world you could not find a simpler arrangement.

The frame is made of well seasoned oak, the jars are beautifully finished and when connected (from 2 up) they are automatically placed in multiple as per sketch above. This, we found, is the best arrangement.

Sizes are: Height, 6 inches; width, 2½ inches; length, 9 inches.

Weight (with 6 jars, complete), 1 lb.

No. **9260** "Electro" Adjustable Condenser, as described, complete with Stand and 6 Leyden Jars **$2.50**

No. **9261** Stand only (complete to take jars) ..... **.40**

No. **9262** Leyden Jar (with spring clip), each ..... **.35**

Leyden Jars.

9221

Our jars embody the best workmanship. The glass used is guaranteed to be the thinnest Bohemian hard glass, free of all harmful salts. We could turn out these jars at almost half the price listed, by using domestic glass, but such jars will leak badly and crack soon. Our jars may be subjected to a remarkably high potential and are very hard to puncture. The tinfoil is at least twice as heavy as that used in other jars and will not "blister."

Solid brass balls are used and the glass, not covered with tinfoil, inside and outside, is finished in bright red shellac, giving the jar a very beautiful appearance, besides preventing leakage.

All our jars can be charged with even our ½-inch coil and the discharging crash of even our 1-pint jar can be heard for blocks. It is powerful enough to kill a cat with a single discharge.

Wetmore, Kans.

Dear Sirs:

Please accept my thanks for YOUR QUICK RESPONSE IN SENDING the telephone receiver and leyden jar.

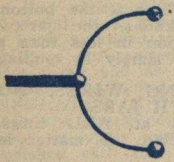
Yours truly,

GEO. B. NEFF.

Only the following sizes are made now:

No.		
9221	Leyden Jar, as described, 1 pint	$0.75
9222	Leyden Jar, as described, 1½ pint	1.00
9223	Leyden Jar, as described, 1 quart	1.50
9224	Leyden Jar, as described, 2 quarts	2.00

Discharger.



4225

There is only one way to discharge a Leyden Jar and that is by using a discharger. Ordinary wire cannot be used, as it is impossible to draw a spark with pointed wires or other objects. The points act like lightning arresters and draw out the charge silently. By using our discharger the bright blue, crashing spark will jump between the two balls as soon as one of the balls of the discharger touches the outside coating of jar, while the other is brought close to the brass ball of the Leyden Jar. Finished in brass. Hard rubber handle.

No. 4225 Discharger, as described $0.35

Carborundum.

Specially selected crystals for experimenting with the Carborundum Detector. Marvelously sensitive.

9308 Per ounce $0.25

Silicon.

There are two kinds of this material: Silicon crystals and fused Silicon. The former, manufactured in this country, is absolutely unfit to use, the latter, imported by us, is the only kind that should be used. It comes in chunks and somewhat resembles graphite. It is very hard and extremely brittle.

9209 Per ounce $0.40

Large Piece 0.10

Molybdenite.

This new substance is the only one discovered so far which does not get out of adjustment, when used in a sensitive Detector, and when placed near a sending gap. Most all substances suffer a great deal from strong sending currents, but it is impossible to damage the adjustment of the Molybdenite Detector; even a heavy discharge does not affect it.

Molybdenite proves incredibly sensitive when distant stations are to be picked up.

9210 Per ounce $0.15

Longmeadow, Mass.

Dear Sirs:

I received my order O. K. AND AM VERY MUCH PLEASED WITH THE ARTICLES.

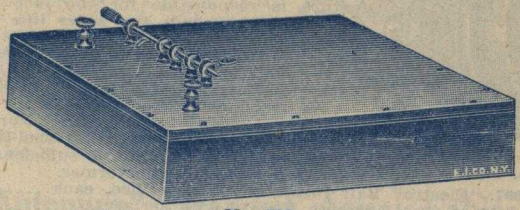
Respectfully yours,

RALPH E. GRISWALD.

"Electro"

Adjustable

High-Tension Condensers



No. 530

For the past few years we have sold these fine condensers with no adjusting arrangement, but of late a heavy demand for a high tension adjustable condenser has sprung up and we are therefore more than pleased to present our condensers now with the adjustable feature.

The connections are made in such an ingenious manner that either one, two, three or all nine or nineteen plates can be put in circuit, simply by sliding the contact rod into more or less contact bushings. The adjustment is quick, sure and easy, no switches or levers need be touched.

The adjustable feature is of incalculable importance for wireless work, as no spark coil, transformer coil, or transformer can work to the highest efficiency without the right capacity, which can only be obtained by means of a condenser with a variable capacity. No. 530 has 5 contact bushings, No. 531 has 10 contact bushings.

The construction is simple and durable, and sparking is absolutely prevented.

The cases are solid quartered oak, ⅜ in. thick, highly finished. For dielectric we use imported French glass sheets of a special grade, 1-16 in. thick, free from salts and air bubbles. Instead of tinfoil we use metal plates. The No. 530 has 9 metal plates, 8 x 10 in., and 10 glass plates, 10 x 12 in. It can be used up to ½ kw. Size over all is 11¾ x 14¾ x 2¾ in. Weight, 17 lbs. Its maximum capacity is .009 microfarads.

The No. 531 has 19 metal plates, 8 x 10 in., and 20 glass plates, 10 x 12 in. It can be used up to 1 kw. Sizes, over all, 11¾ x 14¾ x 3¾ inches. Weight, 26 lbs. Its maximum capacity is .0203 microfarads.

Both condensers are sealed in with a very large amount of Pure Sealing Compound, which not only prevents bursting of the plates, but also safeguards the condenser from breakage, and, to a large extent, from puncturing. Two heavily nickel binding posts are furnished with each size. Each condenser is fully guaranteed as to capacity.

No. 530. High Tension Adjustable Condenser, as described..... $5.00

No. 531. High Tension Adjustable Condenser, as described..... 6.50

Annapolis, Md.

Dear Sirs:

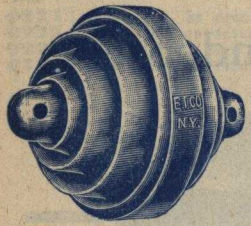
Received your order No. 59630 O. K. to-day. EVERYTHING SATISFACTORY.

Truly yours,

C. C. TODD, JR.

"Electro" Ball Antenna Insulator

The size of this Insulator over all is 3¼x2½ inches, Weight 7½ ounces.



No. 10007

The insulator is made entirely of porcelain in one piece and has a triple coating of brown glaze. The insulating value of this Insulator is of the highest order and greater than similar Insulators.

All the grooves are undershot and this feature is responsible for the fact that the new Insulator **"sheds the water like a duck."**

We guarantee that you will be pleased with this Insulator. It is the cheapest high-grade Insulator ever placed upon the American market and stands in a class by itself.

We recommend one Insulator on each end of an aerial strand for receiving. For sending there should always be two of the Insulators in tandem; this will afford sufficient insulation up to 1 K. W. transformer.

No. 10007. "Electro" Ball Insulator, as described, each.....**$0.16**
In lots of eight (enough for a 4-wire aerial)..... **1.25**

Antenna Insulators

10341 9461 1166

These insulators are beautifully finished and have the highest insulating qualities.

No. 9461 is made of brown; TRIPLE glazed porcelain; size, 1½x2½ in., weight, 4 oz., for receiving only. Price **10 cents.** Per doz., **$1.15.**

No. 1166 is made of glass entirely, the most beautiful insulator ever made. Size 2¼x2½ in., weight, 11 oz., for receiving only. Price each **12 cents.** Per doz., **$1.35.**

No. 10341 (patent applied for). This insulator is made of the same material as No. 9461. It is longer and heavier. Its body is pierced by two round holes, through which the wire loops pass. **For sending up 2-in. spark length.** Will not leak. By placing several of these insulators in series, large spark coils or transformers can be operated without fear of leakage. Size, 3x2¼ in., weight, 14 oz. Price each, **16 cents.** Per doz., **$1.85.**

COMMERCIAL WIRELESS INSULATORS.

10002

These insulators are used on large aerials and are built very substantially in order to stand the enormous strains sometimes experienced in heavy storms. These insulators are now used by the UNITED STATES GOVERNMENT and are made of moulded "Electrose." They will stand discharges of 80,000 volts. Deep corrugations are provided to reduce surface leakage. Powerful wrought-iron rings are imbedded at each end.

Size, 10½ inches long, 1½ inches in diameter.
No. 10002 Commercial Wireless Insulator, as described, each.....**$0.50**
In dozen lots **5.75**

Gloucester, Mass.

D... my order IN PERFECT CONDITION. The coils give WIT... spark. I AM PERFECTLY SATISFIED AND WOULD ...ATE TO RECOMMEND ANY ARTICLE SOLD BY YOU.

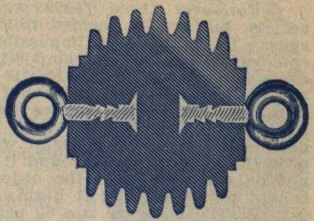
Yours truly,

H. W. BIBBER.

Electrose Ball Antenna Insulator.

The insulator which we offer herewith is made of moulded electrose which is acknowledged to be one of the best insulators on the market. The eye hooks are moulded right into the electrose and the insulator will stand a strain of 600 to 700 lbs. For sending it will actually hold the discharge of a 4-inch coil and therefore can be used in connection with small sending outfits without trouble. The eye rings are wrought iron. Size over all is 3½ x 2½ inches.

No. **10001.** Electrose Ball Antenna Insulator as described, each .20
In dozen lots $2.30



10001

"Antenium" Stranded Aerial Cables.

2509

Everyone interested in Wireless realizes the wonderful conductivity and extreme tensile strength of "Antenium" Aerial Wire used in connection with Wireless Aerials.

Commercial and Government Wireless Stations use no other wire for the construction of their aerials. **They understand the importance of using a wire giving the greatest amount of active surface for the reception or transmission of Wireless signals.**

While this cable is, of course, higher in price than our regular No. 14 wire, it must be remembered that seven strand "Antenium" cable will last practically indefinitely, and while it may be higher in price at the start, it will save money in the end, as it never breaks, nor deteriorates, nor is affected by storms or sleet. **If you wish to see your aerial "stay put" once and for all use "Antenium" Stranded Cable,** and you will never regret it.

SPECIFICATIONS: 7 strands No. 22 B. & S. gauge "Antenium" Wire. Will stand a rupture test of over 1,000 lbs. Diameter of the No. 2509 cabe is .077 in. Diameter of the No. 2510 is .060 in.

No. **2509** "Antenium" Cable, as described, per 100 feet.....$0.75
In 1,000 feet lots 7.00
No. **2510** "Antenium" Cable, as described, but with four (4) strands only instead of seven, per 100 feet.....$0.45
In 1,000 feet lots 4.00

Galvanized Stranded Guy Wire.

This wire is used as guy wire to secure the aerial mast. It is made of 6 No. 18 B. & S. wires twisted and is well galvanized to prevent rust. We do not recommend thinner wire, as it is not sufficiently strong to withstand storms, etc. This wire is furnished in coils measuring 100 feet. NOT LESS THAN 100 FEET SOLD.

No. **1526** Galvanized iron wire, per 100 feet.....$0.35

Chicago, Ill.

Dear Sirs:

I am buying your goods from your Chicago agent, AND AS USUAL FIND THEM FIRST CLASS. Yours very truly, R. H. FLOSTER.

"Antenium" Aerial Wire.

For over three years we have been selling Aluminum wire for aerials, but finally decided to discontinue its sale for several good reasons. To begin it is impossible to obtain pure aluminum wire. The commercial aluminum composition wire is notoriously weak and ruptures at 75 lbs., for the No. 14 size. A sharp bend causes it to break almost immediately; it cannot be soldered except with the greatest difficulty; it **always** makes poor contact, on account of its natural oxide film. We had so many complaints on aluminum wire, that we decided to develop an aerial wire that did not have any of the above objections. We finally found it in our present ANTENIUM wire, which not only has none of the objections cited, but has a great many excellent points making it highly desirable for aerials.

ANTENIUM wire is a 30 per cent. copper wire of enormous strength, even surpassing phosphor bronze in strength. The No. 14 wire stands a rupture test of 330 lbs., against 75 lbs. of Aluminum wire. It can be soldered like ordinary copper wire. It can be bent back and forward and is so tough that it cannot be broken, except with difficulty. It makes excellent contact and does not oxidise readily. **Foot for foot it is as cheap as aluminum wire and three times cheaper than copper wire.**

In appearance it is exactly like copper wire, as a matter of fact it cannot be told apart from copper wire.

It has about 50 per cent. less skin resistance than Aluminum wire.

One pound No. 14 B. & S. ANTENIUM wire has about 125 feet, costing **30c.** One pound No. 14 B. & S. Aluminum wire has 250 feet and costs 60c. Thus ANTENIUM wire is as cheap as the former and is incomparably better.

A 600 feet stretch with ANTENIUM wire is an everyday occurrence **and the heaviest sleet will not damage the aerial.**

We carry only one size now, namely No. 14 which as experience shows is the only kind to use. Heavier wire for aerials is not required as No. 14 is strong enough for the greatest stretch imaginable. Two lbs. (250 ft.) is sufficient for the average aerial.

No. 9219 ANTENIUM aerial wire No. 14 B. & S. (125 ft.) per lb. **30c**

Discounts of 10 per cent. in 10-lb. lots, NOT LESS THAN ½ lb. SOLD.

Aluminum Helix Wire.

As is well known, there is no better material made than aluminum wire for helices of the spiral type. This wire is extremely light, though quite large in size. It can be put in place quite easily and is from 5-6 times cheaper than copper wire. Besides the bright aluminum is always clear and shiny, while copper becomes soon green and brass turns black.

We stock three sizes only. No. 0 B. and S. for helices, 14" in diameter; No. 6 B. and S. for helices, 10" in diameter; and No 8 B. and S. for helices, 8" in diameter. No. 0 measures 11 feet per lb.; No. 6, 40 feet; No. 8, 65 feet per lb.

NOTE.—No. 0 wire comes in coils 14" diameter; No. 6 in coils 10" in diameter and No. 8 in coils of 8" diameter. It does not have to be bent consequently.

No. 526 Aluminum helix wire, No. 0 B. and S., per lb..... **$0.70**
No. 527 Aluminum helix wire, No. 6 B. and S., per lb..... **0.70**
No. 528 Aluminum helix wire, No. 8 B. and S., per lb..... **0.70**

NOT LESS THAN ½ LB. SOLD.

Dear Sirs: **Mansfield, Ohio.**

I received order yesterday, and I AM WELL PLEASED with articles ordered, ESPECIALLY THE SPARK COIL, WHICH WHEN USING SIX OLD DRY CELLS GIVES THE FULL GUARANTEED SPARK LENGTH. Yours truly, HARRY R. KREISHER.

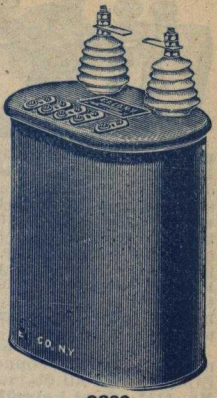
The "Electro" Closed Core Transformers

Commercial as well as experimental stations all over the world are now using exclusively transformers for wireless work, same being cheaper and much more efficient than spark coils for long distances—and even for comparatively short distances of 25 miles, etc.

A transformer is nothing but a spark coil, only constructed differently. The principle, though, is the same in both.

No vibrator is used in a transformer, and only alternating current of ANY frequency can be used. A short but very fat and loud spark about ¼ inch long is produced at the secondary terminals.

No resistance of any kind is used. The A. C. supply of 110-125 volts is connected directly to the transformer, in series of course, with a regular telegraph key such as our No. 1117 or No. 9312. Our ¼ K. W. transformer uses about 2¼ Amperes under full load, which is less than our 1-inch coil takes. The efficiency is very great and in output our transformer equals a 10-inch coil, which lists at $125. We guarantee that the "Electro" ¼ K. W. Transformer will transmit up to 50 miles by using a sensitive detector for receiving. The cost of operation is ridiculously low, about 2 cents per hour for constant working.



9280

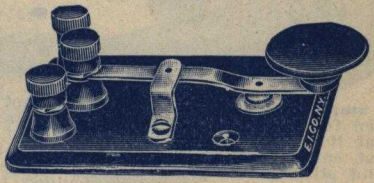
Our transformers are built so well that they can be worked for hours at a stretch and will positively not heat up in the least.

Sizes of ¼ K. W. Transformer: 5⅝ inches thick; 8⅜ inches wide; 13 inches high. Weight, boxed, 30 lbs.

9280 "Electro" ¼ Kilowatt Transformer, as described $18.00
9281 "Electro" ½ Kilowatt Transformer, same construction 25.00
9282 "Electro" 1 Kilowatt Transformer, same construction ... 48.00

"Electro" Telegraph Keys

A new departure in telegraph keys. There has long been a demand for a good, efficient, but cheap telegraph key and the one which we are now manufacturing complies with all demands that anyone could possibly make of a low price key. The parts are mounted on a solid hard rubber composition base, size 2½ x 3½ inches, ¼ inch thick.



1119

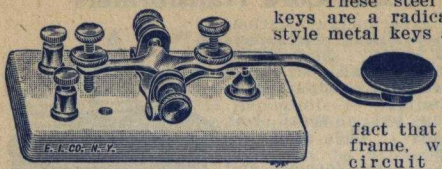
All metal parts are nickel plated and polished and the contact arrangement is simple but absolutely sure. A standard telegraph knob one inch in diameter in hard rubber composition is furnished. The No. 1118 Key has two of our standard rubber binding posts, while the No. 1119 has three of them. This key works easily and there is nothing to get out of order. It will make a handsome addition to any instrument table.

No. 1118 Single Circuit "Electro" Telegraph Key composition base, as described $0.30
No. 1119 Double Circuit (Morse) "Electro" Telegraph Key composition base, as described 0.35

Dear Sirs: New Orleans, La.

I must say the coil you sent me WAS A DANDY AND EVERYBODY I SHOWED IT SAID THE SAME. I will GLADLY RECOMMEND YOUR FIRM to anyone. You may expect more orders from me in the future. Yours respectfully, L. GALLO.

"ELECTRO" TELEGRAPH KEYS.



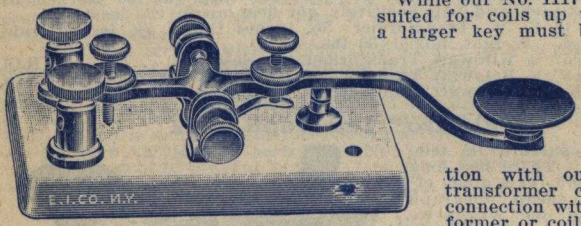
These steel lever, standard telegraph keys are a radical departure from the old style metal keys and the amateur as well as the professional will find these keys far superior to anything that has been offered heretofore. Our new departure is centered in the fact that instead of using a metal frame, which is so liable to short circuit the different parts, **we use a ½" Opal Glass Base.** This not alone gives the instrument a classy appearance, but it enhances at the same time the insulation a great deal, and our keys to-day are without doubt the most beautiful and the best built on the market, barring none. We furthermore do not use a spiral spring to operate the key but use a special kind of a tongue spring which works a great deal easier and smoother than the old style spring. The lever is solid steel, nickel plated and highly polished as are all the metal parts on the key. There is absolutely no lateral motion and the trunnions cannot possibly get loose. The contacts are pure silver. A generous hard rubber handle and two generous binding posts are furnished. If you have once used this key you will never use another.

We only furnish one style of this key, namely the one with top connection. No leg connections are furnished.

Size over all 6½ x 2¾ x 1¾". Size of glass base ½ x 2½ x 4¼".

No. 1117 Steel Lever Key with Opal Glass base as described, each.....$1.00

"ELECTRO" WIRELESS KEY.



While our No. 1117 Key is well suited for coils up to 2" spark a larger key must be used for the more powerful coils, from 3 to 12" spark length, also in connection with our No. 8050 transformer coils and in connection with any transformer or coil **using up to 30 amperes.** Our key will positively not heat up even if 30 amperes are used for hours at a time. This key is similar to our No. 1117 except that it is very much heavier and two extremely large binding posts that can take a No. 6 wire, are furnished. The contact points are solid silver and measure ⅜" in diameter; they are built in such a manner that they can be exchanged in less than two minutes. **No tools being necessary to do this.**

Inasmuch as an **Opal Glass Base** is used, it will be understood that the insulation is the best that can possibly be had and there need not be any fear of short circuit as with metal base keys. For the price at which this key is sold it is positively the greatest bargain offered in wireless keys to-day. We will immediately refund the purchase price if the key is not absolutely satisfactory in all respects. All metal parts are highly nickel plated and hand polished and buffed.

No. 9212 Wireless Key with **Opal Glass Base** as described.....$1.75
No. 9213 Upper Contact for above key..... 0.30
No. 9214 Lower Contact for above key..... 0.30

Pullman, Wash.

Dear Sirs:
I received my order and EVERYTHING WAS IN FINE CONDITION.
Very truly yours,
W. W. BROCK.

High Tension Cable

For Wireless, Etc.

1298

IMPORTED PIRELLI HIGH TENSION CABLE.

This cable is the best imported make. It is made in the famous Pirelli factories in Italy. It is used in most all wireless stations, and can stand an enormously high secondary discharge.

The wires used in the construction of this cable are made from soft drawn copper, covered with two, three and four separate rubber insulations. It is very flexible, and can be handled easily especially for laboratory and transportable purposes. It is an absolute necessity to lead the antennae (aerial) from the station out in the open air. Moisture does not affect it.

The 5 millimetre (diameter) size will stand the discharge of our 1" coil. The 10 millimetre size will stand the discharge up to a 4" coil. We carry sizes up to 15 millimetres for coils up to 8 inches.

No. 1297 High Tension Cable 5m/m Diam., per foot.....$0.08
No. 1298 High Tension Cable 10m/m Diam., per foot..... .15

Not less than 5 foot sold. Discount in 100 foot lots.

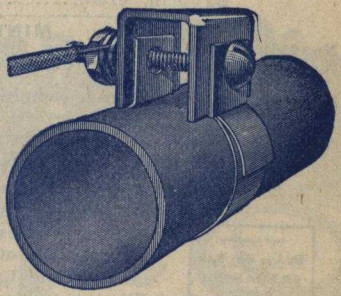
The "Electro" Ground Clamp

The most ingenious clamp ever invented. Invaluable to every wireless experimenter.

"A wireless is not better than its weakest part"—which is usually a poor ground.

Fifty per cent. of all wireless troubles are due to a poor ground.

Our new Ground Clamp is, of course, not used only for wireless work, but for telephone bells, telegraph and lighting work; in fact, everywhere where a good ground is desired on which YOU CAN DEPEND.



10003

It fits any gas or water pipe from ½ in. to 2 ins. diameter. Binding post provided to attach wires. Clamp is installed in less than two minutes. Tools needed to install: A screwdriver—that's all! No soldering to be done, no wires to be wrapped around pipes, which method positively always gives trouble. The contact-band of our clamp (1 in. wide) is of pure copper.

No. 10003 "Electro" Ground Clamp, as described, each.....$0 10

In dozen lots, 85 cents.
Special prices in quantities.

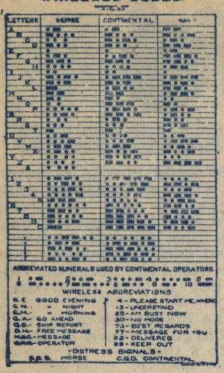
Curacoa,

Muy Sres. Mios:

En Pony receiver que Uds mehan enviado, he recibido en bien orde y estan en mi entera satisfacion.

Mi espero qúe me despachan el resto con el primer ocacion.

EMILIANO M. PENHA.



2501

WIRELESS CODE CHART

This code chart has been brought out by us pursuant to a large demand from our enthusiastic wireless friends, who like to have the three codes, the Morse, Continental and Navy, before their eyes when sending or receiving messages. This is truly a beautiful chart, it being arranged in such a manner that a letter or figure can be "spotted" instantly, without the eye searching for precious seconds. The dots and dashes are very heavy and large and can be easily read 10 feet off and more. There are, in addition, a list of abbreviated numerals as used by continental operators; also the usual wireless abbreviations used by most of the fraternity.

The chart measures 9x11 inches and is printed on stiff cardboard. It will make a fine addition to any wireless station and it will make the latter look a great deal more businesslike.

Comes in two colors: black and red.

No. 2501 Wireless Code Chart.....$0.10
By mail, extra..... .03

MINERAL SETS

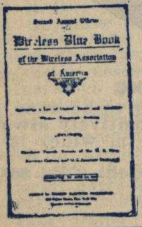
No. 2502 Zincite and Copper Pyrites (Perikon), per set..... .50
By mail, extra..... .04
No. 2503 Zincite and Bornite, per set..... .50
By mail, extra..... .04

MINERALS

No. 2504 Galena, very sensitive, for short distance work; per oz.... .10
No. 2505 Iron Pyrites (Ferron), extremely sensitive, per oz..... .20
By mail, extra..... .04
No. 2506 Peroxide of Lead, compressed tablets, each..... .20
By mail, each..... .02

Wireless Blue Book.

(Official Wireless Blue Book of the Wireless Association of America.)



The Wireless Blue Book which appears each year contains the official list of ALL U. S. Government, Commercial (Land and Ship Stations) and amateur Wireless Stations, their call letters, location, etc. Invaluable if you own a wireless set. All stations are arranged alphabetically. With the Blue Book there is given free of charge a beautiful 3-color chart of the American continent, showing location of all Government and Commercial Stations; size of map 13 x 9½ inches. Price of Blue Book, with chart.....15c

New York City.

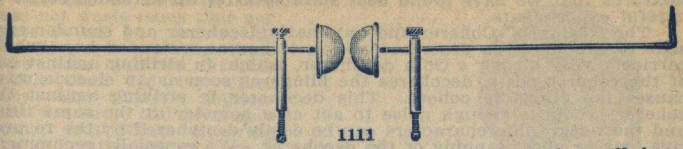
Dear Sirs:

I received the chart of wireless codes and the telephone receiver Saturday last. Glad to say I am MUCH PLEASED WITH THEM BOTH. I find THE CHART VERY HANDY and am able to pick out the letters VERY RAPIDLY because of its FINE PRINTING. Thanking you for YOUR PROMPTNESS, I remain,

Yours truly, A. GERLACH.

"Electro" Zinc Jump Spark Balls.

(Patent Pending.)



1111

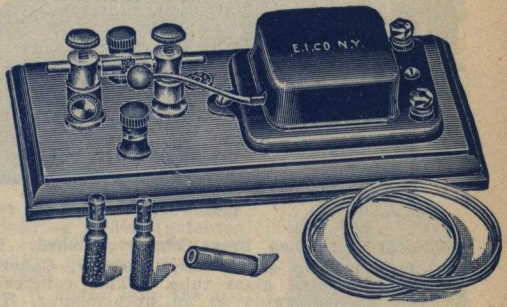
These balls are carefully made of best spun zinc. A small brass tube is inserted, extending from surface to centre of each ball. This serves to receive the "sending" rods, which, being inserted in this tube, are made movable and can readily be taken off for shipment, and can also be turned on their axes if it should be necessary to "direct" the waves towards a given point.

These balls can be adjusted for any desired length of spark by simply loosening one of the binding posts which hold the sending rods and sliding same backward or forward. These balls will prove very satisfactory if the coil is used for other purposes aside from wireless telegraphy, by enlarging the distance between the two balls to such an extent that no spark will "leap the gap." Wires may then be led from the two binding posts which hold the sending rods to the apparatus which is to be used, i. e., Geissler tubes, X-Ray tubes, etc.

No. 1111 One Pair Double Adjustable, Polished Zinc Jump Spark Balls 1¾ inches diameter, Two Brass Sending Rods and Two Connection Stands finished in polished brass.. **$0.90**

Coherers.

Our coherer, which is simplicity itself, has been created by us with the intention of offering to people of moderate means this wonderful instrument at prices which are within the reach of all. We, of course, do not claim that these instruments will replace the very expensive and delicate ones which are used for long distance work, but for distances not exceeding one mile these coherers will perform their work exceedingly well. They are made as simple and strong as possible to construct them.



1097

All instruments are mounted on seasoned, polished quartered oak bases, and all metal parts are heavily nickel plated. The coherer arms are all silver plated and contact tips amalgamated, as we find this in-

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New Orleans, La.

Gentlemen:

The Telimco Coherer and Auto Coherer are giving FULL SATISFACTION. I am able to PICK UP MESSAGES from the United Fruit Co.'s Ships "Ellis" and "Prestin."

Yours respectfully,

GEO. A. DURAND.

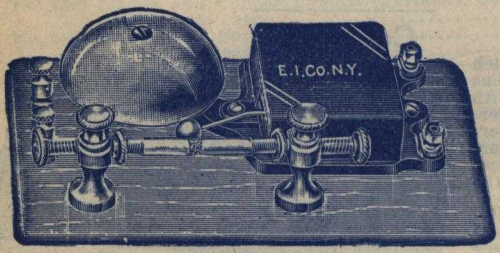
creases the sensitiveness to a very great extent. We employ for filings, mixtures that we have found best suitable after an extended series of careful experiments.

The "Telimco" Coherer and automatic decoherer and sounder consists of a coherer as described above; it has an extended base which carries a very strong 4 Ohm decoherer, which, in striking against one of the coherer posts, decoheres the filings as soon as an electric wave causes the filings to cohere. This decoherer in striking against the coherer produces enough noise to act as a sounder at the same time, and the telegraphic characters can be easily deciphered by the respective long or short tapping of the decoherer. We especially recommend our Rheostat-Regulator in connection with this coherer to regulate the battery current.

NOTE. A coherer is an instrument to work a sounder or bell in conjunction with a relay. **It cannot be used with a telephone receiver.** The coherer, contrary to the detector is used ONLY to make wireless signals loud and audible. Use a coherer only for short distances, not over one mile.

No. 1097 Telimco Coherer with Decoherer and Sounder, 7x3½ inches, including two "catch" wires, one package extra filings and glass tube **$1.00**

Precision Coherers.



1295

These coherers are used where greater accuracy is desired or for distances up to 30 miles. The silver plated, amalgamated coherer plugs are fitted with micrometer screws, which allow to move the screws forward or backward. The regulation is so correct that the plugs can be moved less than 5/1000 inch at a time. All parts are made of burnished brass highly finished. The base is mahogany.

Made in two styles only: namely, Coherer alone, complete with filings and extra glass tube. (This coherer can be used with our graphite-carbon-grains as an auto-coherer, if desired.) No. 1295 Coherer and Decoherer is made adjustable, so that the strength of the tapper can be regulated.

No. **1294.** Coherer alone, complete **$1.35**

No. **1295.** Coherer and Decoherer, complete **2.35**

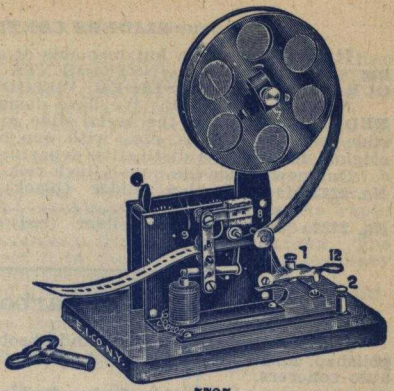
Jerseyville, Ill.

Gentlemen:

About two years ago I bought a coherer with decoherer from you, WITH WHICH I HAVE CAUGHT SIGNALS FROM ST. LOUIS, 45 MILES DISTANT. Of course this took a great deal of experimenting, and adjusting with good relays, tuning coils, etc., BUT IT WORKED. YOUR INSTRUMENTS ARE ALL TO THE GOOD.

Yours respectfully, M. E. LIPSCOMB.

"Electro" Tape Register.



5785

At last we have it! We need not waste much time nor space to tell you that of all uncatalogued articles, there were more inquiries for this article than for any other ones. The cheapest register that was to be had heretofore cost at least $20.00. Knowing the difficulties to produce a cheap register in this country, we decided to have one made according to our specifications in Europe, and, as usual, we succeeded completely.

Our Tape Register is nothing less than a wonder for the price, and if we asked $6.00 for it, you'd pay it! It is an exact duplicate of a commercial register, only built on lighter lines. It has regular ink recording device, ink wheel, tape reel and tape, exactly as shown in cut. There is the usual spring motor to be wound by a key, release and stop, etc. The instrument, furthermore, has a telegraph key attached to practice the code. The register is furnished with a lengthy printed instruction sheet **and a code to learn telegraphy.** By connecting two of the instruments in series regular telegraphic signals can be exchanged between the two stations. The operating key is shown at 12. No. 6 is the release to start the clock work; 8 is the ink felt, and underneath same the ink wheel, which prints the dots and dashes. From 15 to 20 words can be telegraphed per minute.

The Electro Register operates on one dry cell and is used for regular telegraph work; **it will work well with either our No. 1295 or No. 1097 Coherers.** Its precision will amuse and delight you. Sizes over all are: 5½"x4"x7". Weight 1 lb. Each instrument comes packed in box.

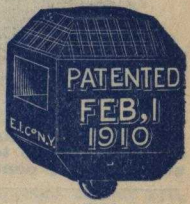
No. 5785 "Electro" Tape Register with key.....$3.50

No. 5786 Extra roll of tape for above, each 0.10

Sliders

The accompanying cut (actual size) shows our new hard rubber ball-bearing slider (patented Feb. 1, 1910). It is the acme of perfection and surpasses in efficiency, quality, accuracy, any slider ever placed on the market.

As it is non-metallic, it slides over the rod with astonishing ease. **NO MICROPHONIC CONTACTS** possible with this slider, no jars in the telephone. The ball is pressed evenly on the tuning coil wire, while the spring which makes contact with the rod, presses firmly on the ball, ensuring perfect contact at all times.



2222

Philadelphia, Pa.

Dear Sirs:

I have received the Sliders and Book and FIND THEM O. K.

Yours respectfully, EDWARD EISELE.

SLIDERS CONTINUED.

It can never stick, but responds at once and quickly, with astonishing ease. ALL OUR INSTRUMENTS ARE NOW EQUIPPED WITH OUR NEW PATENT SLIDER, WITHOUT EXTRA CHARGE.

NOVEL FEATURE. We have devised the same slider in BRIGHT RED composition, for the Aerial slide, and therefore equip all our double slide tuners, couplers, etc., with one black and one red slider. This original feature is a distinctive departure. We lead as usual.

Our new slider fits any ¼-inch rod.

No. 2222 Hard Rubber Slider (black) complete with ball and spring, by mail.....$0.20

No. 2222a Hard Rubber Slider (red) complete with ball and spring, by mail.....$0.20

Graphite - Carbon - Grains.

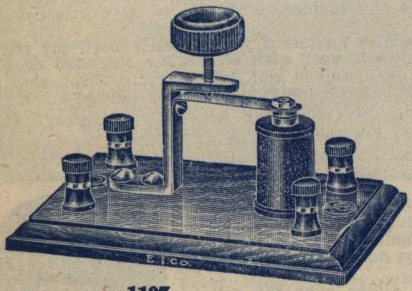
These grains are imported and absolutely uniform. They are highly polished, and will not "cake" together. They are used in all standard auto-coherers.

No. 1296 Polished Graphite-Carbon-Grains, small package.....15c

By mail.....17c

Gernsback Relays

PATENTED DEC. 20, 1910.



1107

We herewith present our new Gernsback relays, which, after six months' experimentation by our Mr. Gernsback, are now ready for the market.

Like in his other many devices, Mr. Gernsback always strives for simplicity, and usually succeeds, not alone in eliminating unnecessary parts, but combining several parts in one.

By means of the big hard rubber thumb screw (pointed sharply at the end) the tension of the fine spring carrying the armature and platinum contact is adjusted with the greatest precision.

Westfield, Mass.

Gentlemen:

I received your relay and am VERY MUCH PLEASED WITH IT.

Yours truly,

J. ELMER CARLS.

GERNSBACK RELAYS—Continued.

The Gernsback relay is from 25% to 50% more sensitive than the ordinary pony relay, as the ARMATURE IS HORIZONTAL AND DOES NOT WORK **AGAINST** GRAVITY, but is assisted by same. No other relay can make such a claim.

Mr. Gernsback designed his relay primarily for wireless in connection with coherer and decoherer work, and it is absolutely the most sensitive relay on the market—none excepted, no matter what its price—except the very expensive polarized types, which are in a class by themselves. For wire telegraphy the Gernsback relay cannot possibly be excelled on account of its rapid and sure action. The Gernsback relay furthermore is not influenced by jars and shocks unless they are very strong. The motion of a ship does not affect it in the least, while an ordinary pony relay would be worse than useless for such work.

All metal parts are lacquered brass, mahogany base, four beautiful generous hard rubber posts and thumb screw.

This relay is absolutely the lightest one made, weighing only 6 ounces.

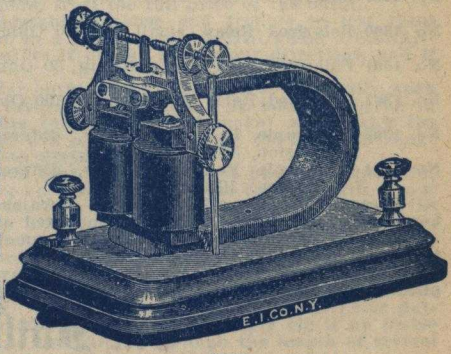
No. 1107	**Gernsback Relay** (Patented 12-20-'10)	20 Ohms.	**.....$1.00**
No. 1108	" "	50 "	**..... 1.10**
No. 1109	" " " "	75 "	**..... 1.25**

Any resistance furnished up to 1,000 Ohms. Prices on application.

Polarized Relays.

These instruments are more sensitive than any other form of relay, and are therefore used preferably to any other type in wireless work for greater distances.

These instruments are so sensitive that they will operate a sounder or a bell if the moistened fingers are placed on the coherer arms. The minute change of resistance has disturbed the balance of the relay and recorded it.



1301

They are used the same way as other relays, and will increase the working distance of an outfit from 100 to 150 per cent. Our "Telimco No. 2" can be made to work up to three miles with No. 1302 Relay. All our relays will operate a call bell, sounder, register, our Electro whistle, a small lamp, etc.

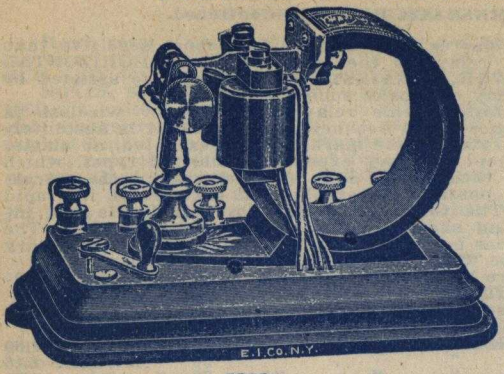
Westfield, Mass.

Dears Sirs:

The relay I bought was ENTIRELY SATISFACTORY, and you may expect another order from me in the near future.

Yours respectfully,

MR. J. ELMER CARLSON.



1303

The philosophy of the polarized relay is as follows: A very strong permanent magnet has mounted on one pole the two spools. It is evident that the polarity on each leg will be the same (both being mounted on the same pole). A finely balanced armature is hung between the two bobbin legs, which never touches the poles however. By means of the set screws the armature is set so that it is exactly in the centre between the two poles. The relay now is balanced. A minute current passing through the spools will disturb the balance and consequently move the armature, which in turn, making connection with the contact-stop, closes the circuit.

No. 1299 Polarized Relay, small size, 20 Ohms, price..... $5.00

No. 1300 Polarized Relay, small size, 50 Ohms, price..... 5.75

No. 1301 Polarized Relay, very strong, 50 Ohms, price..... 7.50

No. 1302 Polarized Relay, very strong, 100 Ohms, price..... 7.75

No. 1303 Quadruple Polarized Relay, differentially wound, finest precision, 500 Ohms, price..... 16.50

No. 1304 Quadruple Polarized Relay, differentially wound, finest precision, 1000 Ohms, price..... 19.50

These relays are all finished in burnished brass mounted on mahogany base; this ba e in turn is mounted on metal sub-base.

Nos. 1303-04 allow to connect each spool separately, cross-wise, in series, or parallel, 6 binding posts.

We can wind these instruments for any resistance. Price on application.

Tin Foil

(For Condensers and Leyden Jars.)

This tin foil is imported by us and is warranted to be the best make. It is quite heavy, and will not be damaged easily. It is not to be compared with the cheap, thin kind used, for instance, in wrapping chocolate, etc. Twelve square feet to the pound. It is furnished in 1 lb. packages only, width 6 inches.

No. 4335 Tin Foil A 1, price per pound..... 25c.

Dear Sirs: Brooklyn, N. Y.

Received the Tinfoil and Silicon; and thank you for YOUR PROMPT DELIVERY.

Yours truly, FRANK GRESSLY.

Complete WIRELESS Outfits

It is now a well established fact that we are the largest makers of experimental wireless goods, not only in this country but in the entire world.

Our firm, which originated in 1904, was the **very FIRST ONE** in this country to sell wireless instruments and we have led the pace ever since. We started with our "Telimco No. 1" outfit, long before a Detector had ever been heard of. Of this outfit over 15,000 sets have been sold. The "Telimco" No. 4 is still eagerly sought by those desiring one giving loud, audible signals, for demonstration purposes, tele-mechanics, schools, etc.

This outfit was absolutely the first low-priced wireless set sold in the United States and was advertised first in the November, 1905, number of "Scientific American." There never appeared another "wireless" ad before ours, and we challenge anyone to disprove this statement.

Our long experience and our originality, coupled with our splendid organization and giving a square deal to our customers, has won us first place in the past and will also keep us in first place in the future. **We lead, others follow.**

As will be seen in the following pages, our complete outfits sell at a lower figure than the separate apparatus. If, however, one or several of the listed pieces are left out from an outfit, THE FULL PRICE FOR EACH PIECE AS LISTED COMES IN FORCE. This does not refer to batteries, which, if left out, may be deducted AT THE PRICE OF **10 CENTS EACH**, and not more, from the full price of the outfit.

We have gone to considerable expense and trouble to test these outfits and we are, therefore, in a position to ABSOLUTELY GUARANTEE the range of all our outfits if put up as per our directions, and if worked intelligently.

If we say that a particular outfit works five miles, it will really work six and even seven under favorable conditions. It must be borne in mind that all wireless outfits (no matter what make) work twice the distance over water than they will over land. During the night the range is 30-50 per cent. greater than during the day.

It is also a mistaken idea that the aerial must be in the open air. As a matter of fact, we have an aerial running the entire length of our building, under the ceiling in the top loft, and although located in the very heart of the "skyscraper" district in New York, with steel structures 10 to 15 times as high as our 5 story building, our testers use this aerial in testing our instruments previous to shipping them, and messages from 20-75 miles come in all day long as clear as a bell. Ether waves pass through solid walls with the same ease as the sunlight shines through a block of glass a foot thick. **Consequently, if you do not feel like putting up an aerial on your roof or in your yard, simply rig it up inside the house, along the ceiling of the hall, or through the length of several rooms, your aerial will be just as efficient as if it were outside.**

The letters used in all the diagrams designate: A—Aerial; B—Battery; C—Coil; D T—Double Slide Tuner; E—"Electro"-Lytic Detector; F—Fixed Condenser; G—Ground; H—Sending Helix; K—Key; KW—Transformer; L—Leyden Jar Condensers; P—Potentiometer; R—Rheostat; S T—Single Slide Tuner; T—Telephone Receiver; V—Variable Condenser; Y—A. C. Supply, 110-220 Volts; Z—Zinc Spark Gap.

Dear Sirs: **Springfield, Ill.**

I received WIRELESS OUTFIT O. K. I have had a good deal of experience in wireless. Your instruments are TWICE AS GOOD AS I COULD HAVE GOTTEN ELSEWHERE FOR THE PRICE.

Yours truly, EARL FRIOT.

RECEIVING OUTFITS

During the past few years great strides have been made in Wireless. Two years ago experimenters were satisfied to receive messages from stations 1-10 miles away. To-day a reach of 25 miles is about the lowest that will satisfy anyone, consequently to keep abreast with the advance ment of the art, we are only listing PRACTICAL OUTFITS, not toys.

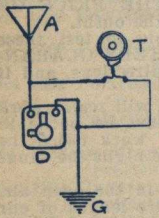
Our outfits are guaranteed throughout and will enthuse anyone who takes up the wonders of Wireless, be it as a study, mere amusement, or a life profession.

Remember, that with anyone of these receiving outfits, it will be possible for you **to learn the code within 2 months,** simply by listening to the messages coming in, consequently **the tuition is absolutely without cost whatsoever.**

To-day there are over 2000 commercial and government stations scattered throughout the U. S. and it is practically an impossibility to pick up the receiver during any time of the day, especially at night, without catching a few messages. Then, also, there are over 700,000 amateur stations throughout the country now, and we do not know of anything more romantic or interesting than to get acquainted by Wireless with a previously unknown party.

There is no nobler art than Wireless, the triumph of mind over matter. The art is so young as yet, its opportunities so tremendous, that it is a wonder that not more people are interested in it. The American experimenters and amateurs have made a great many valuable inventions during the past years, which has brought wealth and fame to many; the field is open to everyone, to YOU, who may to-morrow make a far reaching invention.

Is it not worth your while to invest a few dollars in one of our outfits to get acquainted with the art, and to enjoy some mild excitement by **"listening to the Wireless"?**



R. O.—25.

NO. R. O.—25.

Range 25-30 miles with 4 wire aerial 25 feet above ground.

No. 7777	Universal Detector	$1.50
No. 1024	Telephone receiver	0.40
No. 9219	1 lb. Antenium wire	0.30
No. 9461	8 Insulators at .10 each	0.80

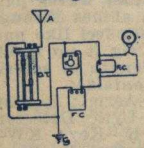
One Blue Print of connections.

Complete R. O.—25 outfit $2.95

This outfit is not tunable.

NO. R. O.—25A.

Range 25-30 miles with 4 wire aerial 25 feet above ground.



R. O.—25a

No. 7777	Universal Detector	$1.50
No. 1024	Receiver	0.40
No. 9950	Jr. Tuning Coil	2.00
No. 10010	Jr. fixed condenser	0.50
No. 10000	fixed condenser	1.00
No. 9219	1 lb. Antenium wire	0.30
No. 9461	8 Insulators at .10 each	0.80

One Blue Print of connections.

Complete R. O.—25a outfit $6.40

Pittsburgh, Pa.

Dear Sirs:

Please find enclosed a money order for which send me receiving outfit No. R.O. 25. I am acquainted with a boy who uses your instruments and JACK BINNS, THE HERO OF THE SHIP "REPUBLIC" was at the boy's home a few days ago, and he said that HE DID NOT SEE A BOY HAVE A BETTER OUTFIT IN AMERICA.

Yours respectfully, HOWARD LUCAS.

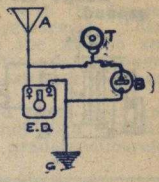
This outfit is well tunable and cuts out different stations by means of tuning coil.

NO. R. O.—50.

Range 50-75 miles with 4 wire aerials 35 feet above ground.

No. 9002	"Electro"-lytic Detector, or	
No. 9235	Peroxide of Lead Detector,	$1.25
No. 8071	Receiver, 1000 Ohms	1.50
No. 1001	"Electro" Dry Cell	0.18
No. 9219	1 lb. Antenium wire	0.30
No. 9461	8 Insulators	0.80
	One Blue Print of connections.	
	Complete Outfit No. R. O.—50	$4.00

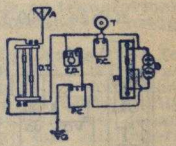
This outfit is NOT tunable.



R. O.—50.

NO. R. O.—50A.

No. 9002	"Electro" Lytic Detector, or	
No. 9235	Peroxide of Lead Detector.	$1.25
No. 8071	Receiver 1000 Ohms	1.75
No. 9250	Potentiometer	1.25
No. 9950	Jr. Tuning Coil	2.00
No. 10000	Fixed Condenser	1.00
No. 10010	Jr. Fixed Condenser	0.50
No. 1001	3 "Electro" dry cells at .18	0.54
No. 9219	1 lb. Antenium wire	0.30
No. 10007	8 Insulators at .10 each	1.25
	One Blue Print of connections.	
	Complete Outfit R. O.—50a	$9.75



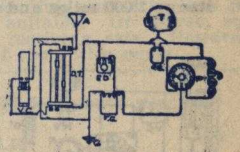
R. O.—50a.

This outfit is perfectly tunable and the intensity of the signals is well regulated by means of the potentiometer. A fine outfit in every respect.

NO. R. O.—100A.

Range 100-125 miles and over, with 4 wire aerial 35-50 feet above ground.

No. 9002	"Electro" Lytic Detector, or	
No. 9235	Peroxide of Lead Detector	$1.25
No. 8070	Amateur Phones, 2000 Ohms	4.50
No. 9255	Potentiometer, new style	2.00
No. 9950	Jr. Tuning Coil	2.00
No. 9240	Condenser	2.25
No. 10000	Fixed Condenser	1.00
No. 10010	Jr. Fixed Condenser	0.50
No. 1001	4 "Electro" Dry Cells, ea. .18	0.72
No. 9219	1 lb. Antenium wire	0.30
No. 10007	8 Ball antenna insulators, ea. .16	1.25
	One Blue Print of connections.	
	Complete R. O. 100a outfit	$15.60



R. O.—100a.

This is one of our best outfits. Its range is quite wide, and the outfit is perfectly tunable. The variable condenser greatly adds to cut out disturbance, static, etc. An admirable outfit in every respect. Strictly up-to-date in all respects.

Wichita Falls, Tex.

Dear Sirs:

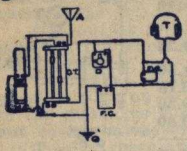
I wish to thank you for YOUR PROMPT ATTENTION in sending out my wireless telegraph outfit; and wish TO RECOMMEND YOUR FIRM to any one who is interested in electric goods.

Yours truly,

A. L. JACKSON, J.B.

NO. R. O.—100.

Range 100-125 miles and over, with 4 wire aerial 50 feet above ground.



No. 7777	Universal Detector	$1.50
No. 8070	Amateur Phones, 2000 Ohms	4.50
No. 8486	A "Electro" Tuner, double slide	3.50
No. 9240	Condenser	2.25
No. 10000	"Electro" Fixed Condenser	1.00
No. 10010	"Electro" Jr. Fixed Condenser	0.50
No. 9219	2 lbs. Antenium Wire	0.60
No. 10007	8 Antenna Insulators, each .16	1.25

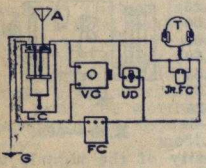
One Blue Print of connections.

R. O.—100. **Complete R. O.—100 outfit.....$15.00**

A fine little outfit. Quick to adjust and perfectly tunable. Especially to be recommended for boats and yachts.

NO. R. O.—1000.

Range 1,000-1,500 miles with 4-wire aerial 60-70 feet above ground.



No. 12002	"Electro" Loose Coupler	$4.00
No. 1305	Professional receivers, 2,000 ohms	6.35
No. 3500	Gernsback Rotary Variable Cond.	4.00
No. 7777	Universal Detector	1.50
No. 10000	"Electro" Fixed Condenser	1.00
No. 10010	"Electro" Jr. Fixed Condenser	0.50
No. 10007	8 Ball Antenna insulators	1.25
No. 9219	2 lbs. No. 14 Antenium Wire	0.60

One Blue Print of connections.

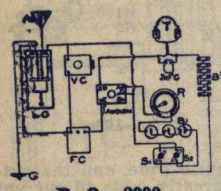
Complete R. O.—1000 outfit....$19.00

R. O.—1000.

A splendid outfit. Tunable within the widest limits. Takes almost any wave length. By means of the loose coupler great accuracy in tuning out unwanted stations is accomplished. Disturbances and static are also cut out almost entirely with this outfit.

NO. R. O.—2000.

Range 2,000 miles and above with 8-wire aerial, 80-100 ft. above ground.



No. 12002	"Electro" Loose Coupler	$4.00
No. 6666	"Government" phones, 3000 ohms	7.75
No. 3500	"Gernsback" Variable Rotary Condenser	4.00
No. 8200	"Electro" Audion	5.00
No. 10000	"Electro" Fixed Condenser	1.00
No. 10010	"Electro" Jr. Fixed Condenser	0.50
No. 5000	"Electro" Rheostat Regulator	0.60
No. 1001	3 "Electro" Dry Cells	0.54
No. 1059	7 Fillable Batteries	1.68
No. 1287	Double Crown Switch	0.30
No. 9219	4 lbs. No. 14 Antenium Wire	1.20
No. 10007	16 Ball Antenna Insulators	2.50

One Blue Print for connections.

R. O.—2000. **Complete R. O.—2000 Outfit..$28.60**

Red Bank, N. J.

Dear Sirs:
Received outfit IN GOOD CONDITION. VERY GOOD SET.
Yours respectfully,
JOSEPH P. MULLIGAN.

This is our very best outfit, our so-called commercial outfit. A better outfit cannot be bought for any money, and we believe it superior to outfits selling at twice and three times its cost.

By means of the fine loose coupler in conjunction with the famous Gernsback Rotary condenser, incredible work can be performed. There is absolutely no detector to-day more sensitive than the Audion and this detector in conjunction with above two instruments and the superb "Government" receivers make it an outfit, **which has positively no equal anywhere on earth.**

With this outfit messages 1,900 miles were received quite clear and a 5 K. W. station 1,100 miles distant came in very loud with a 4-wire aerial. We recommend this outfit to all desiring a high grade commercial set at a moderate cost.

Sending and Receiving Outfits.

While it is comparatively cheap to construct wireless outfits to receive messages from great distances, outfits to send even over short ranges are more expensive, as powerful coils or transformers are needed to create sufficiently powerful oscillations to bridge certain distances.

What has been said under "Receiving Outfits" holds true for sending outfits. All our outfits are UNDERRATED. When we claim that an outfit will work ten miles under most all conditions you can rest assured that it will cover twelve miles quite easily. As we ABSOLUTELY GUARANTEE all our outfits, we consequently underrate them to be on the safe side; our customers, therefore, never run the risk of buying outfits that do not transmit over a specified range.

We even go further. We shall unhesitatingly take back any of our outfits, with all the apparatus and aerials we recommend, which we sell to work over a specified distance, if it can be proven to us that with ordinary care and attention the outfit does not cover the range. We are willing to exchange the outfit in such a case or give credit for the entire amount of purchase, if apparatus are returned in A-1 condition.

Our eight years' reputation is back of US., **THE E. I. CO. ALWAYS MAKES GOOD**—and everybody knows it. **Ask** your friends; they know **us** and will tell you.

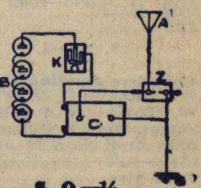
As will be seen we have listed with the sending outfits various receiving outfits. These we have found most suitable. Of course, our customers are at liberty to substitute other receiving sets. However, in that case we cannot guarantee the range of the entire outfit.

NO. S. O.—¼.

Range ¼ mile (sending) with 4 wire aerial 25 feet above ground.

No. 4360	¼" Spark Coil	$3.45
No. 9220	Zinc Spark Gap	0.60
No. 1119	"Cinch" Strap Key	0.35
No. 1001	3 "Electro" Dry Cells	0.54
No. 1313	D. P. D. T. Porcelain switch	0.30

One Blue Print for connections.



Complete Sending Outfit $5.20

Complete with No. R. O.—25 Receiving Outfit 8.00

S. O.—¼.

Gentlemen: Brooklyn, N. Y.

The wireless outfit which we received from you, IS ENTIRELY SATISFACTORY.

Yours truly, ABRAHAM & STRAUS.

This outfit is NOT tunable. For short distance work only. This is our scholar's set.

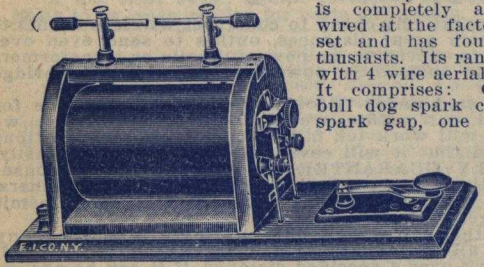
NO. S. O.—½.

Range ¼-¾ miles (sending) with 4 wire aerial 25 feet above ground. This outfit is the same in all respects than the S. O.-¼ except that it has a ½" coil instead of a ¼" coil. It also has 4 dry cells instead of 3.

Complete Sending Outfit No. S. O.—½.....$5.85
Complete with No. R. O.—25 Receiving Outfit..... 8.70

This outfit is NOT tunable. This outfit sends twice as far as No. S. O.—¼. Connections are the same as No. S. O.—¼.

THE "INTERCITY" SENDING OUTFIT.
(The Boy Scouts' No. S. O. 1.)



No. 1900

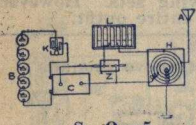
Contrary to our other outfits this set is completely assembled and ready wired at the factory. It is a standard set and has found thousands of enthusiasts. Its range is from 1 to 6 miles with 4 wire aerial 25 feet above ground. It comprises: One No. 1088 1-inch bull dog spark coil, one No. 9220 zinc spark gap, one special No. 1118 key, **one No. 9265 special sending condenser,** all mounted on a heavy polished quartered oak base. With this outfit we furnish furthermore five No. 1001 dry cells and one No. 1313 switch, also blue print of connections. Size over all 6 x 7½ x 14". Weight, 6 lbs. YOU MUST SEE THIS FINE OUTFIT TO APPRECIATE IT.

No. 1900 "Intercity" sending outfit, complete as described above **$8.45**
No. 1900 Outfit and No. 1500 **Interstate** receiving outfit complete. **$12.00**

NO. S. O.—5.

Range 5-8 miles (sending) with 4 wire aerial 35-40 feet above ground.

No. **1088**	1" Spark Coil	**$5.25**
No. **9260**	"Electro" adjustable condenser..	**2.50**
No. **9220**	Zinc Spark Gap.....	**0.60**
No. **9270**	Sending Helix	**1.50**
No. **1119**	"Electro" Strap Key.....	**0.35**
No. **1001**	5 "Electro" Dry Cells.....	**0.90**
No. **1313**	D. P. D. T. Porcelain Switch.....	**0.30**
	One Blue Print for connections.	



S. O.—5.

Complete Sending Outfit No. S. O.—5..$11.25

Complete Sending Outfit No. S. O.—5 and Receiving Outfit R. O.—25a $17.50

This is a tunable outfit, both for sending and for receiving and covers from 5-8 miles. Excellent work can be done with this outfit and it is first class in all respects.

Syracuse, N. Y.

Dear Sirs:

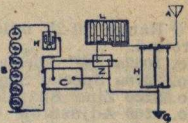
Sometime ago I purchased of you a complete wireless set including a one and one-half inch coil. I have found every instrument to give the BEST OF SATISFACTION, AND ESPECIALLY THE COIL. It is more of a 2-inch coil, and on 10 volts I have drawn a spark two and one-quarter inch in length between two blunt points.

Very respectfully yours, MR. JOSEPH HOVEY.

NO. S. O.—8.

Range 8 miles (sending) with 4 wire aerial 45 feet above ground.

No. 1088 1" Spark Coil $5.25
No. 9260 "Electro" adjustable condenser 2.50
No. 9270a Special Sending Helix 3.75
No. 9220 Zinc Spark Gap 0.60
No. 1119 "Cinch" Strap Key 0.35
No. 1001 6 "Electro" Dry Cells, ea. .18..... 1.08
No. 1313 D. P. D. T. Porcelain Switch..... 0.30
One Blue Print for connections.



Complete Sending Outfit No. S. O.—8..$13.75 **S. O.—8**

Complete Sending Outfit No. S. O.—8 and Receiving Outfit No. R. O.—25a $20.00

This outfit perfectly tunable is the same as No. S. O.—5 except that it has a better sending helix and one more dry cell. Built for hard work and constant use.

S. O.—10.

Range 10-12 miles (sending) with 4 wire aerial 50 feet above ground.

No. 4366 1½" Spark Coil $7.50
No. 9260 Adjustable Condenser 2.50
No. 9220 Zinc Spark Gap 0.60
No. 1119 "Cinch" Strap Key 0.35
No. 9270a Special Sending Helix 3.75
No. 1001 6 "Electro" Dry Cells, ea. .18 ..... 1.08
No. 1313 D. P. D. T. Porcelain switch 0.30
One Blue Print for connections.

Complete Sending Outfit No. S. O.—10.....$16.00

Complete Sending Outfit No. S. O.—10 and Receiving Outfit No R. O.—25a $22.25

This outfit is tunable in every respect and has a good range. To be recommended to any one who wants an outfit to transmit intelligible messages over 10 miles. Connections are the same as No. S. O.—8.

NO. S. O.—15.

Range 15-17 miles (sending) with 4 wire aerial 60 feet above ground.

No. 1089 2" Spark Coil $9.75
No. 9270a Special Sending Helix 3.75
No. 9220 Zinc Spark Gap 0.60
No. 9260 Adjustable Condenser 2.50
No. 1119 "Cinch" Strap Key 0.35
No. 1001 8 "Electro" Dry Cells 1.44
No. 1313 D. P. D. T. Porcelain Switch..... 0.30
No. 9219 1 lb. Antenium wire 0.30
No. 10007 2 High Tension Insulators, ea. .16..... 0.32
One Blue Print for connections.

Complete Sending Outfit S. O.—15.....$19.25
Complete Sending Outfit S. O.—15 and Receiving Outfit R. O.—25a..$25.60
Complete Sending Outfit S. O.—15 and Receiving Outfit R. O.—50a.$29.00

This Sending Outfit is a splendid one in all respects. It has great carrying power and may be used either with the R. O.—25a or R. O.—50a receiving outfits. This is entirely at the option of the buyer. The outfit

St. Louis, Mo.

Gentlemen:

I received the wireless telegraph outfit WHICH GIVES FULL SATISFACTION.

DR. AUG. SCHMIDT.

is thoroughly tunable, free from ordinary interference. High tension insulators are furnished to insulate the aerial in a higher degree. Connections are the same as for the S. O.—8.

NO. S. O.—20.

Range 20-25 miles (sending) with 4 wire aerial 60-75 feet above ground.

No. 1089a	2½" Special Spark Coil	$13.50
No. 9270a	Special Sending Helix	3.75
No. 9220	Zinc Spark Gap	0.60
No. 9260	Adjustable Condenser	2.50
No. 1117	Steel Lever Key	1.25
No. 1001	12 "Electro" Dry Cells, in multiple	1.92
No. 1313	D. P. D. T. Porcelain Switch	0.30
No. 9219	1 lb. Antenium wire	0.30
No. 10341	2 High tension insulators	0.32

One Blue Print for connections.

Complete S. O.—20 Sending Outfit **$24.20**

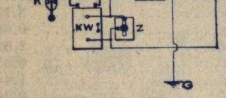
Complete Sending Outfit S. O.—20 and Receiving Outfit No. R. O —100 ..... **$39.00**

This outfit, which is tunable to the highest degree, is greatly recommended by us to all, who really wish a high grade outfit at a very reasonable cost. This outfit is intended to do real hard work and can be depended upon at all times.

This outfit may be greatly improved by using our No. 555, 6 V. 60 ampere hour storage battery instead of the 12 dry cells. The price of the sending outfit alone will then be $30.25, that of the Sending and Receiving Outfit $44.75. Connections are the same as for No. S. O.—8.

NO. S. O.—50.

Range 50-60 miles (sending) with 4 wire aerial 75 feet above ground



S. O.—50

No. 8050	½ K. W. transformer coil	$8.00
No. 9220a	Adjustable Zinc Spark Gap	1.00
No. 530	Adjustable High Tension Condenser	5.00
No. 8271	"Electro" Sending Helix	6.00
No. 8000	Gernsback Electrolytic Interrupter	2.25
No. 8001	D. P. S. T. Switch Block with 2 fuses	0.45
No. 9212	Wireless Key	3.50
No. 8100	"Electro" Antenna Switch	2.00
No. 9219	4 lbs. Antenium wire	1.20
No. 10002	2 Commercial Insulators, ea. .50	1.00

One Blue Print for connections.

Complete Sending Outfit No. S. O.—50. $30.25

Complete Sending Outfit S. O.—50 and Receiving Outfit R. O.—1000. $49.00

This Commercial Outfit, intended for regular work, is a strictly high grade set. It necessitates the use of either 110 direct or alternating current to operate the coil. No batteries are needed.

This outfit is free from interference and may be operated for long hours at a stretch. The 2 high tension insulators are furnished to further insulate the aerial.

Madison, N. J.

Dear Sirs:

I am a steady customer of yours and ALWAYS RECOMMEND YOUR INSTRUMENTS HIGHLY. I wish you would send me your latest catalogue, as I wish to enlarge my wireless station.

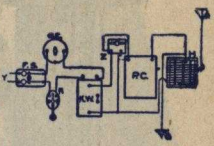
Yours respectfully, WILLIAM C. DUCKHAM.

SENDING AND RECEIVING OUTFITS—Continued

NO. S. O.—100.

Range 100-125 miles (sending) with 6 wire aerial 100 feet above ground.

No. 8050	½ K. W. transformer coil	$8.00
No. 9225	Commercial Spark Gap	3.60
No. 8271	Special Sending Helix	6.00
No. 530	High Tension Condenser	5.00
No. 8000	Gernsback Electrolytic Interrupter	2.25
No. 8001	D. P. D. T. Switch Block with 2 fuses	0.45
No. 9212	Wireless Key	3.50
No. 8100	"Electro" Antenna Switch	2.00
No. 9219	2 lbs. Antenium wire	0.60
No. 10002	2 Commercial Insulators ea. .50	1.00
No. 10003	Ground Clamp	0.10
No. 1166	4 extra glass antenna insulators	0.48
	One Blue Print for connections.	



S. O.—100

Complete Sending Outfit No. S. O.—100.....$32.60

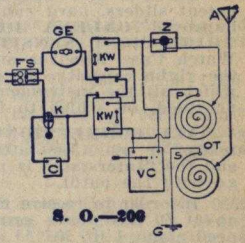
Complete Sending Outfit S. O.—100 and Receiving Outfit R. O.—1000.$51.40

This is one of our best commercial outfits for long distance work. A splendid set in all respects, free from all interference; the delight of the experienced operator. The outfit works under almost all conditions. There are several hundred sets in use now. The extra 4 glass insulators are included to form a 6 wire aerial as outfit No. R. O.—1000 has only a sufficient amount for a 4 wire aerial. Like the S. O.—50 outfit, this set must be used in connection with 110 volts D. C. or A. C.

No. S. O.—200.

Range 200-250 miles with 8 wire aerial, 100-125 feet above ground.

No. 8050	2-½ K. W. Transformer Coils	$16.00
No. 9225	Commercial Spark Gap	3.60
No. 9600	"Electro" Oscillation Tr'sformer	10.00
No. 531	High Tension Condenser	6.50
No. 8000	Gernsback Electrolytic Interrupter	2.25
No. 8001	D. P. S. T. Switch block and 2 fuses	0.45
No. 9213	Wireless Key, Special extra heavy contacts	5.00
No. 10099	Special Condenser to absorb spark of key	1.50
No. 8100	"Electro" Antenna Switch	2.00
No. 9219	6 lb. Antenium wire	1.80
No. 10002	2 commercial insulators, ea. .50	1.00
No. 10003	Ground Clamp	0.10
	One Blue Print for connections.	



S. O.—200

Complete Sending Outfit S. O.—200.....$49.50

Complete Sending Outfit S. O.—200 and Receiving Outfit R. O.—2000.$78.00

This is our best commercial outfit in every respect. It cannot be duplicated for the price anywhere and for efficiency it has earned highest praise from those that are using it constantly. A great many colleges and universities are using this outfit to communicate with other colleges or universities within the radius of the outfit. This outfit is now also used on board of a great many ships and in the Far West and in the South West, to bridge distances over 200 miles. Like the S. O.—50 and S. O.—100 sets, this outfit requires 110 volts A. C. or D. C.

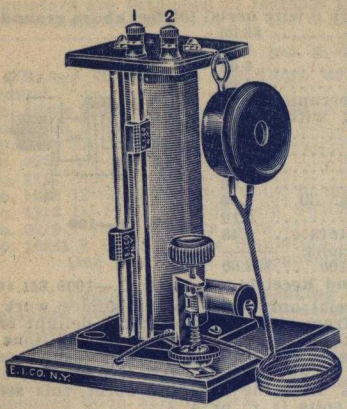
Chicago, Ill.

Dear Sirs:

We are in receipt of your shipment of Jan. 3rd, WHICH PROVED ENTIRELY SATISFACTORY, ESPECIALLY THE RECEIVERS. THE WRITER HAS HAD SOME EXCEPTIONAL RESULTS WITH THEM.

Yours truly,
VACIN WIRELESS LABORATORY.

The "Interstate" Wireless Receiving Outfit



No. 1500

This is the outfit you have been looking for. For the money it certainly eclipses everything that has been offered heretofore in this line. IT IS NOT A TOY by any means, and while we do not claim it to be a commercial set, we do claim that the amateur who owns one is enabled to do excellent work in all respects. On our house aerial, in connection with this set, we have distinctly heard the Boston Navy Yard, 300 miles distant, and were enabled, by means of the tuning coil, to "cut out" the very strong interference from the powerful station at 42 Broadway, but six blocks away from us. We therefore do not think it necessary to add further praise to this outfit.

The very best instruments are used in the **"Interstate."** We do not believe in throwing things together, just to sell the outfits. We don't save pennies, in order to make you spend dollars. If you don't like the outfit, return it. That's our policy. Therefore we must build it right in the first place.

This set comprises:

Our No. 9950 Standard Tuning Coil, bare wire wound, with two patent sliders, hard rubber composition coil heads and posts; our new improved **GALENA DETECTOR**, of wonderful sensitiveness, **THE THIRD MOST SENSITIVE IN EXISTENCE**; our No. 1024, 75-ohm Watch Case Receiver and 3-foot cord; a good condenser, balanced to the right capacity for this set, and a ½ inch thick base board, on which all the instruments are mounted. A handy nickel hook is also provided, on which to hang the receiver when not in use.

ALL CONNECTIONS ARE MADE. When you get the outfit it is ready for use. Just attach the aerial to post 1, and ground to post 2, and the **"Interstate"** is ready for use. Full and very explicit directions go with the outfit.

In order to receive messages up to 300 miles or over, a 4-wire aerial about 50 feet above ground, 50-75 feet long is required. For this you need about 1 lb. No. 14 antenium wire and 8 of our No. 10007 insulators.

By using the No. 8071 Receiver the distance is increased from 20-25 per cent. With the No. 1307 Receiver still better results are obtained.

Size over all of this set is 9x6x6 inches. Weight is 2¼ lbs.

No. 1500	"Interstate" Wireless Outfit, as described	$3.75
No. 1501	"Interstate" Wireless Outfit, with No. 8071 Receiver....	5.00
No. 1502	"Interstate" Wireless Outfit, with No. 1307 Receiver....	5.75

NOTE. By using our No. 8487 loading coil (see page 18) the wave length of this outfit is increased greatly, and time signals from the powerful Government stations can be plainly heard.

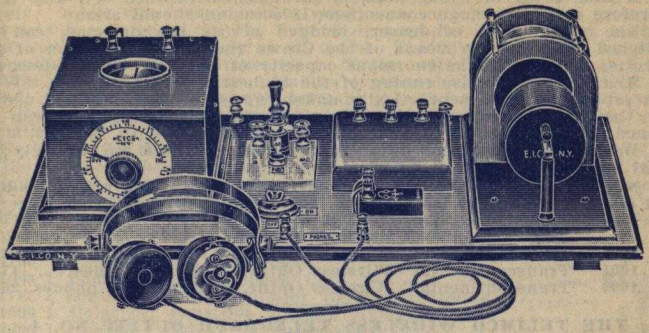
Gentlemen: **Brownwood, Tex.**

I can hear messages WITH MY 75-OHM RECEIVER that a friend cannot hear WITH A 1000-OHM TYPE OF ANOTHER MAKE.

Yours truly, R. H. HARWARD.

The "Transcontinental" Wireless Receiving Outfit

"ALL THAT THE NAME IMPLIES"



No. 1600

For three years we have tried to find out what kind of an outfit the up-to-date amateurs—"those who know"—are after. The **"Transcontinental"** is the result of our extended labors. We did not think that we could get up an outfit that would satisfy nine out of ten of the more advanced wireless enthusiasts, but we think that the present outfit will satisfy the most exacting.

The **"Transcontinental"** is absolutely first class in ALL respects and beyond reproach. It has the best instruments money can make. Its workmanship is superb, its working splendid.

With a six or eight-wire aerial it is possible to reach from 1,500-2,000 miles under ordinary conditions and very much further under favorable conditions during night time, or when the ether is "very clear." With this outfit on our 70-foot, four-wire aerial, on top of our building we have repeatedly heard Colon, a distance of 2,200 miles. Therefore we know whereof we speak.

This outfit comprises:

Our No. 3500 Variable Condenser, No. 12002 Loose Coupler, No. 9506 Commercial Detector, No. 10000 Fixed Condenser, No. 10010 Jr. Fixed Condenser, No. 1305 Telephone Receivers, No. 1286 Crown Switch, 4 large nickel posts, 5 name plates.

This selection of high grade apparata is mounted on a heavy polished oak base ¾ inch thick, size 24 x 15 inches. The instruments are all screwed down on the board **AND ALL CONNECTIONS ARE READY-MADE** at the factory.

There is no wiring to be done when you receive the **"Transcontinental."** It is connected after the latest approved "hook-up," the one used by the German Government sets.

St. John, N. B.

Dear Sirs:

I bought one of your electrolytic detectors last fall, and I may say IT IS THE BEST I HAVE EVER USED. I CAN PICK UP CAPE COD WITH IT, and a few other instruments, IN ANY OF KIND OF WEATHER.

Yours truly,

R. S. CRAWFORD.

At the head of the board are two heavy nickeled posts, one for the aerial, the other for the ground. The outfit is ready for use when you get it, just attach the aerial and ground leads to the posts and you will receive immediately.

A blue print of connections is furnished with each set, and it is therefore easy to change connections if occasion should arise.

The small fixed condenser, bridged across the detector, can be switched off or on by means of the Crown Switch for variation of the circuits. Thanks to the enormous capacity of the Variable Condenser—0.1 Micro Farad, precise tuning of the highest order is possible. With this set interference is practically unknown, as by the combined use of the Variable Condenser and the Loose Coupler, most anything can be "tuned out." The same to a large degree is the case with "static."

We cannot recommend this outfit too highly, nor too strongly; it must appeal to the most experienced.

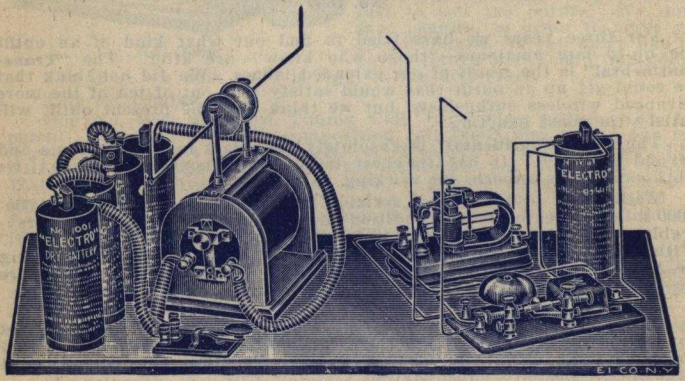
NOTE. If time signals are to be received with this set, a loading coil must be used in series with the loose coupler primary. **See page 18.**

The size of the outfit over all is 24x15x7 inches. Weight is 15 lbs.

We furnish Galena with the Detector.

No. 1600 "Transcontinental" Wireless Outfit, as described.....**$24.00**
No. 1601 "Transcontinental" Wireless Outfit, without phones..... **17.65**
No. 1602 "Transcontinental" Wireless Outfit, with No. 6666 phones. **25.25**

THE TELIMCO WIRELESS TELEGRAPH OUTFIT NO. 4.



1100

This outfit is known as a loud audible wireless outfit, for the reason that the messages can be made to be heard all over a room, contrary to other wireless outfits which do not give off a loud audible sound but necessitate telephone receivers attached to the ears.

The "Telimco" outfit is of the type as was first used when wireless telegraphy came into use, and finds to-day a large use wherever it is

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Gentlemen: **Buffalo, N. Y.**

The Telimco outfit I purchased from you, HAS BEEN WORKING VERY SATISFACTORILY. I advise every beginner in wireless telegraphy TO PURCHASE ONE OF YOUR OUTFITS, as it shows very clearly the governing principles of wireless telegraphy. I have NEVER, AND WILL NEVER REGRET having purchased YOUR "TELIMCO" WIRELESS TELEGRAPH OUTFIT.

Yours truly, WM. H. COIT.

The "TELIMCO" Wireless Telimco W. T. O. No. 4 Telegraph Outfit—(Cont).

necessary to get loud audible sounds, such as in experimenting, class room work, etc., and where it is necessary to close circuits or contacts at a distance (telemechanics). Thus with this outfit and an extra relay, lights can be made to light at a distance, a gun can be fired off, etc., etc. While our former outfits were more or less toys, the present outfit has been created on the urgent demand for a first class outfit which would work unfailingly at all times. The "Telimco" outfit as per illustration will work a distance up to 50 feet without any other aerials as those shown; for greater distances it becomes necessary to add a ground on each side. This will increase the distance up to about 300 feet. By using ground and regular aerials, the distance is increased up to 3 miles.

We guarantee that this outfit can be relied upon to work accurately and the decoherer bell will ring every time the key is depressed at the sending station. We are prepared to furnish still better and more complete outfits using specially heavy Polarized Relays and Vacuum Coherers for long distance work, etc., and shall be pleased to quote prices on application.

No. 1100 "Telimco" No. 4 comprises:

No. 1088	1 1-inch Bull-Dog Spark Coil	$5.25
No. 1111	1 Set Adjustable Oscillator Balls and Stands	.90
No. 1300	1 Polarized Sensitive 50-Ohm Relay	5.75
No. 1295	1 Precision Coherer and Decoherer	2.35
No. 1001	5 Best "Electro" Dry Cells, each, 18c	.90
No. 1118	1 Telegraph Key	.30
No. 1017	½ lb. Connecting Wire	.18
No. 1100	Complete Outfit Boxed	$15.50

Where two complete sets for intercommunication are ordered, we furnish 2 extra D. P. D. T. Switches, No. 1313, free of charge.

Weight complete, boxed, 30 lbs.

If outfit is ordered without batteries we allow 10 cents per battery.

Range of this outfit is from 2 to 3 miles guaranteed.

We cannot recommend this outfit too strongly, especially for experimental work, class-room work, telemechanics, etc.

INSTRUCTIONS FOR SETTING UP AND OPERATING THE TELIMCO NO. 4 WIRELESS SYSTEM.

Transmitting Station:—Connect the three batteries B, in series as shown in the diagram, being careful to connect the carbon terminal of one cell, to the zinc of the next, etc., until all are hooked up, excepting posts No. 1, and No. 3. These two terminals are connected as seen in diagram, No. 3, to post 5 on Key K, and No. 1, to post 2, of the spark coil primary. The other post on the spark coil, No. 6, is connected to post 4, of Key.

Whenever the Key K, is depressed, the spark coil should deliver a steady spark between the zinc balls, S.

Receiving Station:—The receiving instruments are connected up as follows, using bell wire also, and scraping the copper clean and bright wherever it goes onto a binding post. One piece of wire joins posts 9 and 15 of the relay R, to post 10, of the dry cell B. Another piece of wire joins post 14, to post 13, of the sounder-decoherer, S. D. The other post 16, is wired to 12 of the battery. Normally the relay armature is open, and the decoherer does not receive any current. The coherer terminals 7 and 11, respectively, are hooked up to posts 8 of the relay magnets, and post 12 of the battery B. C is the Coherer tube with metal filings within it.

Dear Sir: **Ashtabula, Ohio.**

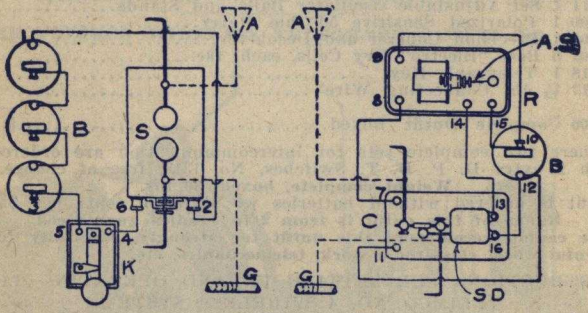
We use your Telimco No. 2 for calling repair men ¼ and ½ miles away, AND IT IS O. K.

Yours truly, J. W. BAUGHMAN.

The relay (of the polarized type) has to have its armature carefully adjusted by means of the spring A. S., and should have the limit screws at either side first adjusted, so that the armature is just held against the back or insulated stop screw. It may be necessary to reverse the wires to posts 8 and 9, to make the relay throw over, as its armature is magnetized by a permanent steel magnet, and it will not throw over unless the current applied to its magnet coils, is of a certain direction, i. e., aiding the attracting pole. The pole faces are adjustable by screws passing through them, and the armature should have very little play between them; **the less the better.** The final adjustment of the relay armature should be such that it will just stay open when no spark occurs at the sending station.

It must be adjusted very carefully, as upon this the whole success depends. A mere breathing against the relay armature should close the circuit, and operate the bell or decoherer.

Now adjust the coherer by either widening or narrowing the space occupied by the steel and silver filings inside the glass tube, until the filings barely fail to cohere and complete the "main" circuit, i. e., move the relay armature. (The more filings used, the more sensitive the coherer will be.) If, therefore, after careful adjustment, the decoherer gives signals, **AFTER** a spark has been given, take out some filings until satisfactory results are reached. (Never under any cir-



cumstances touch the filings with your fingers, as the natural oil of the skin will make the filings absolutely worthless.) The distance between the silver plugs of the coherer are finely adjustable, by the threaded screws, and this allows the sensitivity to be varied widely.

To have the apparatus give the best results, and especially for distances over 200 feet, one wire of both sending and receiving station should be "grounded," that is, connected to water or gas pipes, as shown by dotted lines G. Where there are no water or gas pipes with which to connect the ground wires, you can easily do that yourself by driving a piece of iron pipe, or an iron bar, into the ground where there is much moisture, soldering the ground wire to top of same to insure good connection.

For distances of over 300 feet, it will be necessary to erect a pole at each station at least 20 or 25 feet high (and high enough to clear intervening objects) and run the aerial wires A to top.

IT WILL BE UNDERSTOOD THAT A COMPLETE "TELIMCO NO. 4" OUTFIT HAS ONLY ONE SENDING AND RECEIVING STATION. To work both ways, that is for intercommunication, two complete sets are required.

Dear Sirs: **Hartford, Conn.**

Your "Telimco" Wireless Telegraph outfit came yesterday. All the apparatus were IN GOOD ORDER, and I am VERY WELL SATISFIED with my purchase.

Very truly yours, DONALD PRENTICE.

PART TWO.

Apparatus & Instruments

THE ELECTRO IMPORTING CO.

233 Fulton Street
New York
U. S. A.

23 Rue Henri Maus
Brussels
BELGIUM

How to Photograph Electrical Discharges

By H. GERNSBACK,
President Electro Importing Company, Editor
"The Electrical Experimenter."

(Copyright 1907. Reproduction. even in part will be prosecuted.)

The following most extraordinary experiments, which, of course, can be varied hundredfold, can be performed with any of our coils, the ¼ inch one included. The ordinary photographic plate is used for all the experiments, its size depending on the objects.

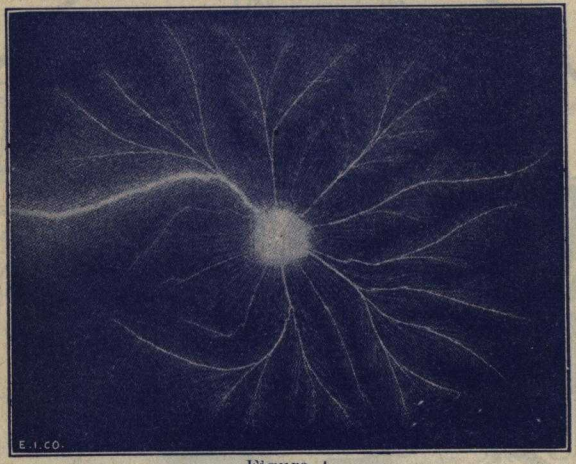


Figure 1

It is self evident that such experiments must be conducted in a dark room or in a room lighted only with a ruby (red) photographic lamp. Any white light will spoil the plates instantly. After exposing, the plate must of course be developed, which you can easily do yourself, or else re-wrap it in its black paper and have a photographer develop and print the negative.

Take a small bottle with wide mouth and fill it half full with very dry and pure starch powder, sulphur flour, or with talcum powder. Over the mouth place a thin piece of gauze to act as a fine sieve. Tie the gauze around the neck of the bottle with a string.

Take the photographic plate and place it (with the coated side upwards) on a metal plate, or a piece of stiff sheet iron, tin, etc. Connect the metal plate with one of the secondary posts of your coil.

Gentlemen: **Philadelphia, Pa.**

I received your 1-inch spark induction coil. I tested the coil with 6 IGNITION TYPE, DRY CELLS, AND RECEIVED THE SURPRISE OF MY LIFE. The coil NOT ONLY gave the GUARANTEED 1-INCH SPARK but also a 1 3-16-INCH SPARK WITH EASE. It was also possible to get a FLAME SPARK ⅞ INCH LONG AND TO PIERCE PARAFFINE SHEETS ⅛ INCH THICK.

Very truly yours, H. E. McMANUS.

Sieve a thin film of the above-named powder over the photographic plate. Now place a very fine metal point (big needle or pin) in the middle of the prepared plate. Connect the point with the other post of the coil, and make **one** spark. If the duration of the discharge is longer than one second, the results will not be as nice. The plate, after the powder has been wiped off completely with a soft cloth, is ready for developing.

Different results will be obtained if the polarity of the metal point is changed.

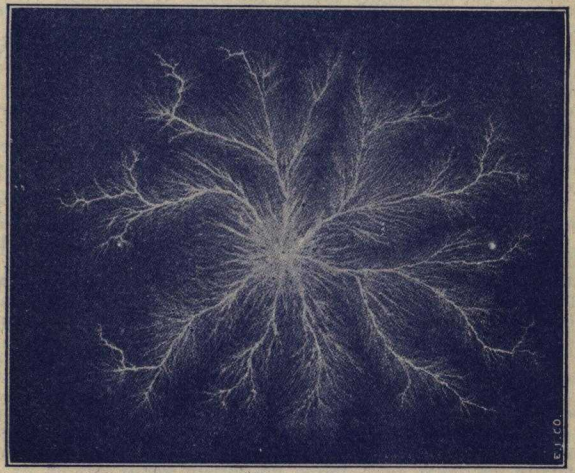


Figure 2

Fig. No. 1 (made with a ½ inch coil) had the point connected with the negative pole. The point of Fig. No. 2 (same coil) was positive. Note the white centre ball of Fig. No. 1.

The most beautiful symmetrical and other designs can be made as follows:

Cut a pattern (such as a star, your initials, etc.) in a piece of cardboard and place this on the photographic plate. Now sieve the powder over the pattern, and when this is removed the design alone will show on the plate.

Place the metal point in the centre of the design and give a spark as explained above.

Of course, no two photographs will ever be alike, and the greatest surprises are experienced frequently by the creation of new designs, branchings, etc. The working in this field is the most interesting and the most grateful.

Dear Sirs: **Newark, N. J.**

I received my one-inch Spark Coil in excellent condition. IT WORKS FINE AND GIVES A GOOD ONE-INCH SPARK. AM PLEASED WITH IT. Sometime ago I purchased a universal detector stand AND IT ALSO WORKS FINE, BESIDES IMPROVING THE APPEARANCE OF MY STATION.

Yours truly, NELSON LOCKWOOD.

Experiments With Spark Coils.

Connect two short pieces of wire to the two top binding posts. Make a "spark gap" by leaving a small space between the wire points. If the coil is started with the battery, a steady stream of sparks will flow between the points. It can be intensified by tightening the thumb screw.

If the "spark gap" is about ⅛ inch, a "fire ball" will be observed between the points. If the experiment is continued the positive wire will get white hot and finally fuse at the end. If the wires were copper the fire ball will be green; if of iron, reddish yellow; if of zinc, blueish.

To lengthen the spark, attach a metal ball, or metal disc, to the negative pole. The positive pole should have a sharp point. The lengthened spark will not be single; it will tend to branch out.

Another method to greatly lengthen the spark is as follows: Moisten the cover of coil box between the two wire points with your finger. The spark will at first be thin, but it will enlarge gradually as the moisture dries. This method lengthens a spark three or four times. A 1-inch spark coil will very often give 3 or 4 inches. The experiment is very interesting.

If a thin glass plate is placed in the spark gap, the spark will not be straight, but it will hit around the plate's edge in zig-zag form.

A very striking experiment is done as follows: Bend two thin iron wires vertically in such a manner that they run parallel. With a little experimenting the right distance how to space the wires will be found. The spark will then start at the bottom and run up swiftly in ladder fashion. As soon as it reaches the top it stops, only to recommence at the bottom. It will work automatically for hours, and never fails to attract considerable attention. The sparks also emit a strange noise.

Lengthen the spark gap 4-5 times and strew carbon powder or metal filings between it. The spark will select a route of its own in a peculiar manner. The experiment is greatly beautified in the dark.

A small cup of benzine, gunpowder, etc., can be exploded if placed in a spark gap; but of course great precaution is necessary for such experiments.

If the flame of a candle is brought near the spark gap, the spark will be drawn into the flame (hot air being a better conductor for the current than cold air). If the candle is blown out and if the wick is touched at once by the spark, it will light up again.

If a piece of cardboard is put between the spark gap it will be pierced. The bigger the coil the thicker the cardboard can be. Note the very peculiar hole the spark has made, and compare it with a hole the needle has made. Explanation: The current comes from both sides.

Dear Sirs: San Francisco, Cal.

The following is concerning the good work done with the HALF INCH ELECTRO IMPORTING CO.'S SPARK COIL. About a month ago I communicated with a certain amateur friend in Palo Alto, Cal., in broad day light, using a 6 V. 66 A. H. Storage battery, an aerial of four strands of stranded wire, 75 feet high, and 165 feet long, directly connected to said coil. No condenser or helix was used.

The distance to Palo Alto IS ABOUT 35 MILES FROM HERE AND CONSIDERING THE SIZE OF THE COIL, I consider this A VERY GOOD PIECE OF WORK. I HAVE A WRITTEN PROOF OF THE ACHIEVEMENT, AND ALSO HAVE A FRIEND WHO WAS "ON THE AIR" WHEN IT WAS DONE.

Yours sincerely, RICHARD JOHNSTONE.

If your friend smokes cigarettes you can play an amusing trick on him. Offer him some of your cigarette paper prepared as follows: Place 10 or 15 leaves on a metal plate to which one wire of the coil leads. Take the other wire (which must be well insulated or you get a shock) and move it all over the surface of the cigarette paper; the more sparks you make in different places the better the trick will turn out. The idea is this: The paper will be pierced with numerous fine holes,—too fine to be observed,—and when your friend tries to light the cigarette after he carefully rolled it, he will waste a box of matches without being able to get as much as one puff, on account of the wrong draft. If he tries three or four of your leaves and if he is still unable to get as much as one whiff, you can hardly blame him if he commences to say a few things—or he may quit smoking cigarettes altogether.

If an old incandescent bulb is connected with one wire, and if the other is grounded, the ball will emit a greenish light in the dark, as soon as the coil starts working. If one wire has a very fine point and is not too far away from the other wire, a very peculiar and weird discharge will be observed in the dark.

If a drop of oil is placed in the spark gap it will be scattered around violently through the spark.

If your neighbor's dog has the habit of extracting things from your ash can, lead a well insulated wire to the can, which must stand on a piece of very dry wood. Ground the other wire. When you see the dog standing on his hind legs and leaning against the can, bring your coil in operation. You will never see a more surprised dog in your life, and you can vouch that he will never come near that particular ash can again, even if it should be full of soup bones.

We leave it to the ingenuity of the experimenter to devise new experiments, tricks, etc., and shall be pleased to hear of such, for the benefit of other experimenters.

The most beautiful and startling effects, however, are created by lightening Geissler tubes, listed and explained on page 68. It is impossible to do the tubes justice on paper,—one must see them. We cannot recommend them too strongly, and a coil is never complete without at least one tube, which, by the way, never wears out. Our smallest coil will light our biggest tube for hours, and our 1-inch coil will light 8-10 medium tubes simultaneously if connected in series. As all tubes are different in color, the most beautiful effects and designs can be created. In a store window they will stop every passer-by without fail. For parties a weird effect is obtained by suddenly turning out all the lights and operating a single large tube near the ceiling. It will startle the most phlegmatic man, and the ladies will swear they saw a ghost.

IMPORTANT NOTE: If for some reason a coil does not give the right spark length, bend the vibrator spring a little back (towards the thumb screw). The stiffer a vibrator works the better the spark will be.

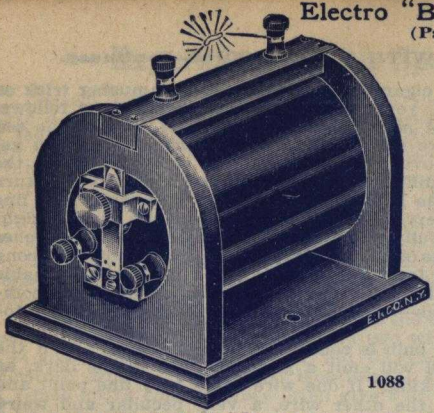
Dear Sirs: Hallowell, Me.

Please send me your electrical and wireless catalogue. I thought at first I would make the set myself, but I saw your adv. in an electrical paper, so I am sending for a catalogue. Roger Hall, a friend of mine got his spark coil of you, and says IT GIVES A LONGER SPARK THAN RATED.

Yours respectfully, B. STEEVES.

Electro "Bull-Dog" Spark Coils.

(Patents Pending.)



1088

It is a well known fact that we are **today** supreme in spark coil manufacture. We can prove that we sell more spark coils for experimental work than any two other concerns in the world.

The new "Bull Dog" type is the outcome of our 8 years' experience in this work, and for workmanship and appearance it stands unmatched.

We departed from the old, cold looking box style and now enclose the primary, secondaries and condenser all in a fine fibre tube, enhancing the appearance a great deal and also making the coil far more compact and lighter at the same time.

A new French double spring vibrator with **double adjustment** is used now, giving extremely fast vibrations.

The insulation is superb, internal sparking is quite impossible, as the greatest care is exercised to insulate all parts with the most expensive sealing compound.

Our coils are especially constructed for use in wireless telegraphy, and we have devoted considerable labor and time in experimenting to produce something that we can recommend confidently to our customers. Our aim has been to furnish a coil not easily injured, even by rough handling, and these coils may be subjected to considerable rough usage without injury. The usual form of Ruhmkorff coil we found was too delicate and easily put out of order, and we therefore do not manufacture same. All the good features of the Ruhmkorff are embodied in our coils, and we guarantee them to give a very powerful and "fat" spark, impossible to obtain with any other coil. All the experiments cited on pp. 44 & 45 can be performed with our coils, and we guarantee our coils to give better results for a longer period than any other coil.

We employ a condenser of large capacity in parallel with the vibrator, which decreases the sparking thereof as much as possible. **All** our coils have condensers, even the ¼" one. The vibrator contact points are thoroughly hardened and will last almost indefinitely, providing the coil is not abused by the use of too strong a current.

If we say a coil gives 1" spark, this means that a 1" spark will be thrown across a gap one inch long, between **two sharp points**, not between balls, plates, etc. We always guarantee our coils to give the full spark length. To get best results use storage cells, which are by far the most efficient current. Our Edison batteries will range next in efficiency. **We do not guarantee** the spark length with **dry cells, as** their current is not steady enough. However, it is understood that they will give excellent results if treated intelligently.

The secondaries of all our coils are wound with enameled wire. Our competitors use bare wire, **which leaks.**

Dear Sirs: **Alameda, Cal.**

I tested the one-inch coil with a 6 volt, 6 ampere dynamo, and could with point dischargers, OBTAIN A STEADY SPARK OVER ONE INCH LONG. COULD SEND OVER SIX MILES, which took me by surprise, the aerial was 32 feet long, made up of four copper wires, on spreaders two feet wide, suspended from a mast 80 feet high. The detector WORKED FINE; COULD PICK UP SIGNALS without any trouble.

Yours truly, F. ARNBERGER, JR.

No. 4360	¼"	use 2 type R.O. cells, or 3 No. 10050 Gordon's, or	3 dry cells
No. 1087	½"	use 2 type R.E. cells, or 4 No. 10050 Gordon's, or	4 dry cells
No. 1088	1"	use 3 type R.E. cells, or 5 No. 10050 Gordon's, or	5-6 dry cells
No. 4366	1½"	use 3-4 type R.E. cells, or 6 No. 10050 Gordon's, or	6-7 dry cells
No. 1089	2"	use 4 type R.E. cells, or 7 No. 10050 Gordon's, or	2 dry cells

PRICE LIST.

No. 4360	¼	inch coil, price	$3.45
No. 1087	½	inch coil, price	4.00
No. 1088	1	inch coil, price	5.25
No. 4366	1½	inch coil, price	7.50
No. 1089	2	inch coil, price	9.75
No. 1090	3	inch coil, price	18.00
No. 1091	4	inch coil, price	30.00
No. 1093	6	inch coil, price	72.50
No. 1094	8	inch coil, price	88.00
No. 1095	10	inch coil, price	125.00
No. 1096	12	inch coil, price	145.00

These coils can be used to advantage for all kinds of work where high tension currents are required, such as **wireless telegraphy,** lighting Geissler and X-ray tubes, and for other interesting experiments.

Coil Parts.

A good many people, for some purpose or other, wish to assemble their own coils, and for their benefit we list below separate and complete parts, exactly the same as we use ourselves to make our standard Bull-Dog coils. Everything is exactly as represented. Primary and secondary are ready wound. The secondaries have No. 34 ENAMEL copper wire, wound by machine. The secondaries are then boiled in paraffine wax; faulty insulation is impossible with our construction. Sparks can positively not jump from one to the next layer.

Parts for One-half Inch Coil.

No. 1 Oak ½" Bull-Dog frame, enclosing tube and top binding posts	$0.50
No. 2 Hammerblow Vibrator, genuine platinum points, including binding posts, screws, etc	1.00
No. 3 Primary Coil, complete with core	.40
No. 4 Secondary (½ spark) High Insulation	.85
No. 5 Condenser	.40
No. 6 **Complete parts for one-half inch coil**	3.00

IMPORTANT: See next page for necessary sealing wax and insulating paper.

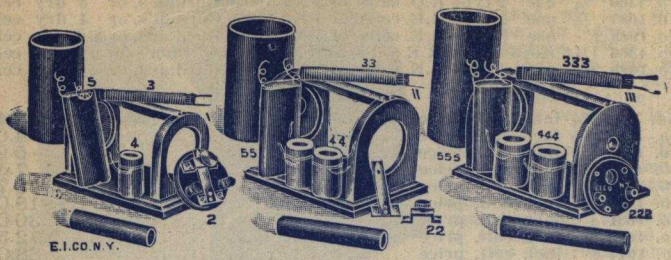
Parts for One Inch Coil.

No. 11 1" Bull-Dog Oak Frame, enclosing tube and top binding posts	$0.65
No. 22 French Rapid, Double-Spring Vibrator, heavy platinum points, composition plate including binding posts, screws,	1.35
No. 33 Primary Coil, complete with iron core	.40
No. 44 Secondary Coils 2, of the No. 4 type	1.65
No. 55 Special Condenser	.45
No. 66 **Complete parts for 1 inch coil**	4.40

IMPORTANT: See next page for necessary sealing wax and insulating paper.

Gentlemen: **Chillicothe, Mo.**

I received today by express the jump spark coil, AND WAS MORE THAN SATISFIED WITH IT. IT WAS A BETTER COIL THAN I EXPECTED FOR THE PRICE, THAT I PAID FOR IT, and I want to say that from what little I have bought of you, I AM PERFECTLY SATISFIED WITH YOUR DEALINGS. LEO HIRSH.



Parts for One and One-half Inch Coil.

No. 111 1½" Bull-Dog, oak frame enclosing tube and top binding posts $0.75
No. 222 Extra Strong Spring Vibrator, extra heavy platinum points, including binding posts, screws, etc..... 1.50
No. 333 Primary Coil complete heavy insulation..... .60
No. 444 Two Secondary Coils, extra large size, special high insulation 2.85
No. 555 Big Capacity Condenser ..... .65
No. 666 **Complete parts for 1½ inch coil**..... 6.30

Parts for Two-Inch Coil.

No. 112 2" Bull-Dog oak frame, enclosing tube and top binding posts $1.00
No. 113 Extra Strong Double Spring Vibrator, large platinum points, binding posts, screws, etc..... 2.00
No. 114 Special Primary Coil, very large..... .85
No. 115 Two Extra Large Secondary Coils, special insulation.... 3.95
No. 116 Extra Large Condenser..... .90
No. 117 **Complete parts for 2-inch Coil**..... 8.65

IMPORTANT: See below for necessary sealing wax and insulating paper.

No. 6984 Sealing Wax, extra fine quality, per lb..... .10
"How to make and use Induction Coils" by Trevert, postpaid..... .55

IMPORTANT. All secondaries MUST be insulated from condenser by means of at least 4 layers of our Empire Paper. Per yard, **$0.20.**

NOTICE: The above parts, if put together correctly and intelligently, will produce the spark as stated, which we absolutely guarantee. The parts are used by ourselves in our ½, 1, 1½ and 2 inch spark coils, with the above material. Of course it is understood that, for instance, vibrator No. 2 cannot be used with 1 inch or 1½ inch coil. All the above parts are selected and scientifically "balanced" out to procure the required spark. If parts are interchanged we do not guarantee the spark length.

Gentlemen: **Rosser, Manitoba.**

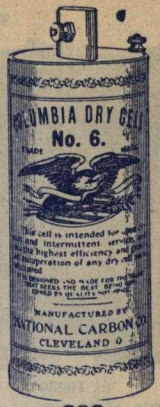
It may be of interest to you to know that the one-inch "Bull Dog" spark coil purchased from you some time ago, IS WORKING FINE. IT GIVES A STEADY SPARK OVER ONE INCH IN LENGTH. The spark is also MUCH THICKER THAN THAT OF MOST COILS. The peroxide of lead detector IS VERY SENSITIVE, AND IS A FINE INSTRUMENT. Very truly yours, **JAMES L. GREEN.**

THE COLUMBIA DRY CELL.

Without a doubt, the Columbia Dry Cell is positively the best on the American market, barring none, and irrespective of price. This cell is used more extensively for ignition purposes than any other cell made, which in itself is the highest testimonial of efficiency. It is largely advertised and recommended, making further praises unnecessary.

We handle the Columbia Dry Cell No. 6, which is the type most suitably adopted for the needs of the experimenter and amateur. Contrary to most dry cells, the Columbia will not detoriate when not in use, as there is no local action due to impure chemicals. The amperage is higher than any dry cell of equal size, and the life outstrips any other cell made. All these qualities render the cell most suitable for operating the coils of wireless sets, as well as motors and other apparatus **requiring steady and heavy currents.**

As in the case of the "Electro" dry cell, the Columbia cell can be recharged by following the simple directions given with each purchase. The cells thus recharged, are almost the equal af the new ones, each cell being capable of recharging at least twice, to 25% of the former efficiency. It is obvious that the Columbia is the cheapest dry cell in the end, giving greater current and longer life than other cells.



990

No. 990. Columbia Dry Battery, 1½ Volts, 20 Amperes, **$0.23**
2½ x 6 inches. weight 29 ounces.

No. 990. In 12 lots. each ....**.18**

The "Electro" Dry Battery.

1001

This is one of the best batteries ever manufactured and we do not believe a better one can possibly be manufactured for the price. This battery, which is in extensive use in the trade, sells entirely upon its merits. It is a well-known fact that most dry batteries when standing on the shelf unused for a short period quickly degenerate and lose most of their power, as the local action is too strong; the "Electro," however, can stand idle for a considerable length of time without disintegrating, as there is absolutely no local action when battery is not in actual use.

A very important point about this battery is that it can be recharged quite easily when once run down, and we guarantee that it will come up to nearly its original standard when thus fully recharged. Any one can do it.

This information will only be given with battery purchase.

No. 1001 "Electro" Dry Battery.
2½ x 6 in., weight, 29 oz.....**$0.18**
Ditto, in 12 lots, each..... **.16**

BATTERY CONNECTORS.

These connectors insure reliable connections and avoid the annoyance experienced when using ordinary wire. Made of specially prepared copper, just the right length to connect various sizes of dry cells.

6323

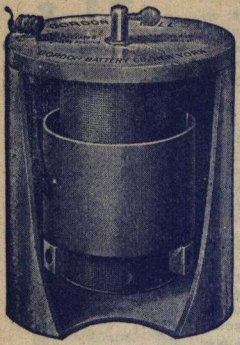
No. 6323. Connectors, per dozen.....**$0.15**

Dear Sirs: Lynn, Mass.

Received battery and lamps in good order. I find battery ALL RIGHT and lamps are ALSO SATISFACTORY. AM PERFECTLY SATISFIED, and will have another order for storage batteries later.

Respectfully, RALPH R. MINOTT.

THE GORDON PRIMARY BATTERY.



10050

This battery is recognized as being one of the very best ones that can be used wherever **steady, strong** current is required. The Gordon battery will light small lamps for long hours without any disintegration. It will run small fans, **spark coils,** slot machines, phonographs, X-Ray coils, etc., and is used very successfully in electro plating. It is highly recommended for storage battery charging. The voltage of any size Gordon battery on open circuit is 0.9. This is really lower than the voltage of dry cells, but one has to consider the great amount of current and the very high capacity, which is the dominating factor.

We give very explicit instructions with each battery, and they can be very easily handled and cared for.

There are only seven parts to this battery, namely: The copper oxide element, the zinc element, the jar, the cover, the connection binding post, the Electro Sodium, and the bottle of Paraffine Oil. Simplicity is the keynote of this famous battery.

We guarantee the capacity in all instances.

No. 10050 Gordon Primary Battery, **complete,** with oil and soda, size 4½ x 7 inches, capacity **100 Ampere Hours.** Price each, **$1.85;** six lots, price each..... **$1.75**

Recharge (Renewal) complete (zinc, copper, sodium and oil), each, **$1.00;** six lots, each..... .93

No. 10060 Gordon Primary Battery, **complete,** with oil and soda, size 5¾ x 8 inches, capacity **150 Ampere Hours.** Price each, **$2.50;** six lots, each..... 2.30

Recharge (Renewal) complete (zinc, copper, sodium and oil), each, **$1.25;** six lots, each..... 1.15

No. 10070 Gordon Primary Battery, **complete,** with oil and soda, size 6½ x 9¾ inches, capacity **300 Ampere Hours.** Price each, **$3.00;** six lots, each..... 2.85

Recharge (Renewal) complete (zinc, copper, sodium and oil), each, **$1.75;** six lots, each..... 1.63

Storage Batteries

With these we are offering something new to our customers. We know that everyone having dry cells is dissatisfied because such batteries do not last for continuous work where a steady strong current is required. Nearly everybody wants storage batteries, but the price (three to six dollars for a small cell) makes it prohibitive for the buyer.

With these facts in mind we have constructed a battery that, despite of its unparalleled low price, is the best that money can buy. See our guarantee—that's all we ask.

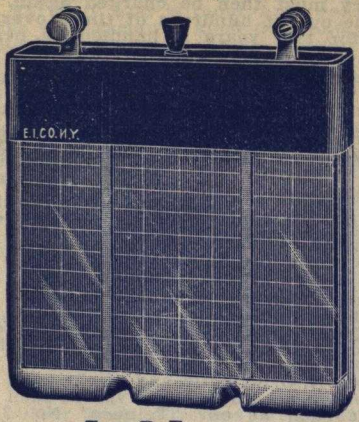
For seven years we have been selling these batteries, but they were not sealed up and the acid would evaporate and spill. The demand for a sealed up battery has been growing every year, and we decided to abandon the open type in favor of the closed sealed type.

The plates, with our seven years' experience in making them,

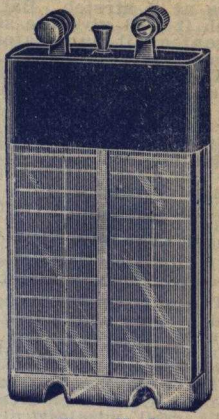
Gentlemen: Norwood, N. J.

I received your apparatus IN GOOD SHAPE, AND THEY ARE SIMPLY DANDY. THE BATTERY WORKS FINE. I hope soon to have another order for you.

Yours truly, ARTHUR HOAKE.



Type R. E.



Type H. O.

are the same reliable ones. The same is true of the jar, separator and other material used.

Our batteries must be shipped "dry" of course, that is, without the electrolyte (acid), as the railroad and express companies refuse to take batteries containing acid.

To mix the acid proceed as follows:

In a clean porcelain vessel pour ten parts (by bulk) of distilled or rain water. Into this pour under constant stirring one part of chemically pure sulphuric acid (oil of vitriol) 66 degrees Beaume. If the solution has cooled, test it with a hydrometer. It should now read 1260° specific gravity.

The electrolyte is then filled in carefully in each cell through the opening by removing the soft rubber vent stopper until it stands ¼ inch over the top of plates. Battery should then be charged as per directions.

Commercial acid or hydrant water should under no circumstances be used; it will spoil the battery in a few weeks.

It is a good plan for owners to recharge their batteries once every two weeks, no matter if run down or not. This treatment will keep batteries in perfect shape and they will last much longer. When battery stands idle for over a month, first discharge same and recharge again.

Type R. E. should be charged with a steady current of two amperes for ten hours. It will then give twenty ampere hours, that is a current of one ampere strong, for twenty hours long, or two amperes for ten hours. Type H. O. should be charged with two amperes for five hours. Its capacity is ten A. H. It will run, for instance, a small motor which takes one ampere, ten

---

Dear Sirs: **Atlantic City, N. J.**

Permit me to thank you for the QUICK DELIVERY of my goods. The time was only five days, including Sunday, from the time I mailed the order. I CERTAINLY AM PLEASED WITH YOUR PROMPTNESS.

Yours truly, EARLE GODFREY.

hours at a stretch. Battery must then be charged again, after which it will give the same output hundreds of times over. We guarantee all our plates for two years if handled as per our instructions.

To charge cells: Only direct current can be used. Any electrician in your town who has charge of a private plant will be glad to charge your cells. The usual rate is ten to fifteen cents per cell.

If you have direct current on your premises you can charge the battery yourself. We sell charging attachments for any voltage and give explicit directions with same. When ordering state voltage of your line.

If you have alternating current it will be impossible to charge storage cells unless our "Electro"-Lytic rectifier is used, which changes the alternating current to direct.

If you have no current available, do not try to charge with dry cells. They would be spoiled inside of one hour.

The charging voltage must always be higher than the combined voltage of the batteries. A fully charged storage cell, with charging current on has 2.5 volts. When the charging current is taken off the voltage of cell will drop at once to 2.2 This is correct.

Three small cells of types H. O. will run any of our coils up to 1½ inch. Coils from 2 to 4 inch need 5 cells of type R. E.

A small wireless plant such as our "Telimco" No. 2, our "Telim" will send from 20% to 30% further and the signals will be much more vigorous on account of the greater capacity of the storage batteries, which will create an immensely stronger spark than can be had with any other form of current.

One cell, type R. E. will make a number 18 copper wire 5" long, white hot, and when the experiment is continued for one minute, the wire will fuse and finally melt.

One cell, type H. O. will fuse and melt the same wire 3" long. No other storage battery in the world can do such a thing.

Where a steady strong current is required nothing can equal a good storage battery.

TESTING.

The only reliable way to test a storage battery is with the means of a low reading voltmeter. If the experimenter wants to know how far the battery is run down, the voltmeter readings should only be taken when the battery is actually working. Other tests are of no value whatever, as a storage battery, even if run down altogether previously, will nearly always register two volts per cell, on open circuit, as it is well known that accumulators always recuperate on open circuit. If they are put to work, however, the voltage immediately drops. Therefore, "Open" readings are of no value. The owner of a storage battery should always test it before starting in to use it; it will save him much annoyance. Each cell should be tested individually, as this is the only reliable way.

A fresh charged cell usually registers 2.25 volts on open circuit; when working from 2.10 to 2.15 volts. As soon as the voltage falls to 1.80, the battery should be recharged at once, as the voltage falls rapidly from this point.

Norwood, N. J.

Dear Sirs:

I received my order. EVERYTHING WAS O. K.

Yours truly,

ARTHUR HAAKE.

A storage battery—no matter what make—will stop working very abruptly and without any warning at all. This generally puzzles the layman a good deal and, of course, he blames it all on the battery, as he cannot account for the drop. If he would have taken a voltmeter reading before starting in to use the battery he would have found that the cells registered about 1.85 volts each.

Never test an accumulator with an ammeter—that is, never connect the instrument directly across the battery. It is a "dead short circuit," and is not alone very harmful to the cell, but it might burn out the instrument easily, and surely bring it out of adjustment.

1251 Complete cell, type R. E., **SEALED UP** (see cut), 20 ampere hours, 2 volts, containing 1 positive and 1 negative plate, with hard rubber connecting posts not affected by acid, separators, rubber bands, directions; weight when filled with acid, 4 lbs., size of glass jar 6"x6"x1". each.....$2.00
In six lots, each 1.80
In twelve lots, each 1.70

1251a Glass jar for R. E. cell, 6"x6"x1"..... 0.30

1251b Positive or negative plate **ready formed**, 6"x4½", each..... 0.35

1252 Complete cell, type H. O., **SEALED UP** (see cut), 10 ampere hours, 2 volts, containing 1 positive and 1 negative plate, with hard rubber connecting posts not affected by acid, separtors, rubber bands, directions; weight of cell with acid, 3 lbs., size of glass jar 6"x3"x1", each.....$1.25
In six lots, each $1.10
In twelve lots, each 1.00

1252a Glass jar for H. O. cell, 6"x3"x1"..... 0.25

1252b Positive or negative plate, **ready formed**, 4½"x3", each..... 0.28

Hydrometers

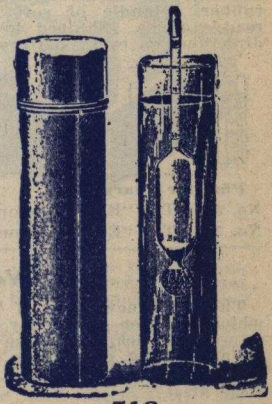
When making up solutions for our storage batteries, electrolytic rectifiers, the Gernsback interrupter, etc., it is absolutely necessary to know the specific gravity of the acid solution.

This can only be ascertained accurately with our hydrometer.

Insert the hydrometer in glass (furnished by us) and fill acid in glass. When reading the scale of the hydrometer a certain value is found. If the reading is too high, the solution is too strong, and water must be added until the specific gravity is correct. If too low, acid must be added, and so on.

Our hydrometers are all imported and warranted to be accurate. They come in handsome wooden box, with acid stand-glass, as illustrated. Invaluable in every laboratory.

SCALE FROM 1100° to 1800°



518

No. 518. Hydrometer, as described, each.....$0.30

Pottsville, Pa.

Gentlemen:

Received order in GOOD CONDITION. ALL O. K.

Yours, JESSE K. JONES.

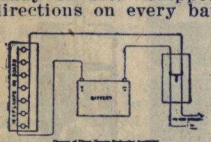
"Electro" Storage Batteries

555

6 Volts, 60 Ampere Hours. Size 6¾x7¼x7 in. Weight 25 lbs. Used on board of several U. S. battleships. Same style used in the Oldsmobile, Pullman and a number of other high-class automobiles for ignition and lighting. Five plates in each cell, 2 positives and 3 negatives. 15 plates in one battery.

This battery, which was first designed by us as an automobile battery (where it meets with the greatest abuse on account of shocks, etc.), is absolutely "fool proof." There is nothing to get out of order, and with ordinary care this battery will last for five years.

Every experimenter knows that there is practically no equal to a **good** storage battery. It is a pleasure to run your coil or other apparatus when you know there is lots of "juice" behind it. This battery will melt a No. 10 B. & S. copper wire and gives about 200 amperes in short circuit (although we do not recommend this test as if performed often, will weaken the plates). Our battery comes in treated oak case. There is absolutely nothing to corrode. Binding posts and automatic vents are of hard rubber. Handle of soft rubber. Battery is shipped fully charged ready to use. Shipped in strong wooden, non-overturning box. Full directions on every battery.



Plan for Charging.

Any garage or power plant will recharge the battery for about 25 cents. If you have direct current, you can charge it yourself at a cost of 8-10 cents by using a bank of lamps to cut down the current.

If you wish to know more about this wonderful BATTERY, send 2c stamp and we will send you our "Treatise on Storage Batteries."

No. 555 The "Electro" storage battery, 6 V., 60 A.H. **$8.00**

No. 556 The "Electro" storage battery, 6 V., 40 A.H. **$6.25**

Low Voltage Transformers

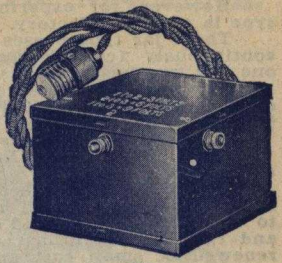
This is a new type of low voltage alternating current transformer which has been evolved by us and is no doubt, to-day, the most efficient as well as cheapest on the market. This transformer can only be used on alternating current up to 110 volts, any cycle. It reduces the 110

Dear Sirs: **Williamstown, Mass.**

I received your storage battery some time ago and want to tell you, THAT IT WORKS JUST AS STATED, AND IT'S THE BEST LITTLE STORAGE BATTERY I HAVE SEEN. I would now like you to send me your Static Machine, for which I enclose money order.

Yours truly, DOUGLAS WILD.

volt current to 3, 6 or 9 volts. Connections are provided, so that these voltages can be taken off. This transformer can be used to operate small railways, small motors, bells, spark coils, electro magnets, telegraph instruments, lamps, etc., etc. It is understood, however, **that storage batteries can not be recharged** with this transformer as this naturally only furnishes alternating current. For the uses enumerated above, however, this transformer will do wonders and will replace storage cells and dry cells in a great many instances. The cost of operation is almost negligible as the transformer uses much less current than a 16 c. p. lamp. **The output of the transformer is 40 watts.**



55

The apparatus is enclosed in a steel case, and the windings are immersed in an insulating compound. Each transformer is equipped with plug and 8 feet of flexible cord, so that it may be attached to any alternating current lamp socket. It has no moving parts to get out of order and with ordinary care will last a long time. The size is 5x4x3¼ inches. Weight 8 lbs.

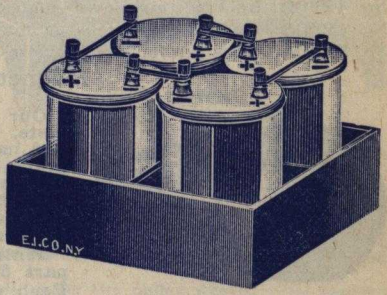
No. 55 Transformer as described, complete.....$3.15

The "Electro"-Lytic Rectifier

This article at last fills a demand which has become burning. For the past years we have been flooded with mail to supply a rectifier to change alternating current to direct.

As is well known, alternating current **can not be used to charge storage batteries** and for a great many other purposes also, direct current only can be used. This especially is the case with spark coils for wireless, etc.

On the other hand, the experimenter who has an alternating current supply, when using our rectifier can perform more experiments which he could not do heretofore.



12500

Our rectifier works on any cycle alternating current up to 110 volts. It must be used in connection with a lamp or water resistance and cannot be connected to the current supply without the resistance in series with it.

The efficiency of the 4 jar rectifier is 85%, AND THERE IS NO LEAKAGE usually found in other rectifiers. The 4 jar rectifier furthermore USES BOTH SIDES OF THE CYCLE, which accounts for the high efficiency.

Of course, a one or two jar outfit may be used successfully, and EVEN ONE JAR ALONE rectifies alternating current to direct but the efficiency is necessarily low, as only one half of each cycle is used.

Dear Sirs: Tunkhannock, Pa.

I wish to say that everything I have ever ordered of you HAS BEEN PERFECTLY SATISFACTORY. Yours truly, H. HAROLD TWIMAN.

However, for experiments using little current, the one jar type is very satisfactory.

The 4 jar type passes as much as 5 amperes and can be used continuously (charging storage cells) with 2½ amperes. The one and two jar types pass ⅓ of the above amperage.

Our rectifiers come ready for use. All you have to do is to dissolve the salts in HOT water and fill in jars, whence the rectifier is ready.

The 4 jar type comes with a wooden tray (see illustration) which holds the jars. No tray is furnished if jars are bought separately.

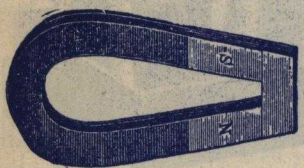
The covers are of heavy porcelain, and marks in plain sight. Binding posts are hard rubber, unable to be short-circuited or to shock you. The lead and aluminum plates are quite heavy, and the latter will last for months. If used up they can be renewed at small cost and exchanged with new ones in a few seconds.

New aluminum plates will **not** be sold separately except to users of the rectifier. When ordering renewal plates it is ABSOLUTELY REQUIRED that you give us your order number or date of purchase.

OTHER PARTS ARE NOT SOLD.
Directions and diagrams **only** furnished with rectifier.
Every rectifier is guaranteed.

No. 12500	Four jar rectifier, as described, with tray	$5.00
No. 12501	One jar rectifier, as described	1.25
No. 12502	Renewal aluminum plates, each	.20
No. 12503	Renewal salts (charge for one jar)	.25
No. 12504	Glass jar for rectifier, size 4½" x 6½"	.20

Magnets



Our line of magnets is quite complete. They are extremly powerful and are all imported. Highest grade of steel only is used. Each magnet guaranteed to lift twice its weight.

Hundreds of experiments can be performed with our magnets.

Finish is the finest possible, upper part finished in bright red lacquer. Each magnet has an armature.

537

No. 535	Magnet, 2 inches long, each	$0.05
No. 536	Magnet, 3 inches long, each	.08
No. 537	Magnet, 4 inches long, each	.12
No. 538	Magnet, 5 inches long, each	.25
No. 539	Magnet, 6 inches long, each	.40
No. 539a	Magnet, 8 inches long, each	1.00

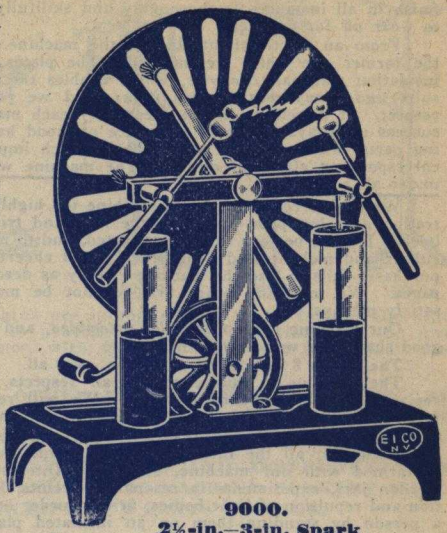
London, Ont., Can.

Dear Sirs:
I received the coherer and IT WORKS FINE.
Yours truly,
C. HEENEY.

THE "ELECTRO" STATIC MACHINE.

To use the most modest expression, we believe that our new "Electro" Whimshurst Static Machine, manufactured in our own shops, is the best ever placed on the American market and at a popular price within the reach of all.

After noting with keen disappointment the dissatisfaction of our patrons through the purchases of the old style static machine formerly handled by us though manufactured by another concern, we decided to evolve a new design, both superior in electrical and mechanical principles. In connection with the sales of the former static machine, we were in many extreme instances compelled to refund the money to a dissatisfied customer.



9000.
2½-in.—3-in. Spark.

From a mechanical standpoint, our new machine is far superior to the former one. To begin with, the only materials embodied in the construction consist of *metal, glass* and *hard rubber,* no wood or other flimsy material being used. Machines constructed of wood are bound to warp and lose their accuracy within the course of a short time.

The former machines had plates of glass, 50 per cent. of which were broken before reaching our customers through transit. The 7-inch plates we now use are made of *Electrite* and are all machine moulded with tin foil sectors pressed right into the plates. A tabulation of the advantages possessed by heavy foil sectors pressed into the plates is hardly necessary in the limited space at hand.

The base is of cast iron, as well as the two pulley wheels. The neutralizers are of steel, while the horizontal arm carrying the collector discharges from the brushes, is of hard rubber. The handles on the discharge arms, as well as the handle on the crank, are of the same material.

The two Leyden jars are made of the best Bohemian glass, free from lead and other mineral salts, to withstand the mechanical and electrical strains. These jars are smoothly coated with tinfoil, inside and outside, and in accordance with the policy throughout the construction, interchangeable should they become broken through accident.

In place of the usual leather belts for driving the plates, we have substituted special designed spring brass belts. These spring belts will not become slack after years of use, whereas leather belts give continual trouble in becoming stretched.

Gentlemen: Brighton, Mich.

I received my Static Machine and put it together. IT WORKS FINE, GIVING A FULL 3-INCH SPARK. You will find 4c in stamps inclosed for one of your catalogues.

Yours very truly, E. R. ROBERTS.

All the metal parts are nickel plated and highly polished, while the cast iron base is beautifully finished in highly polished black enamel. The nickel finish in all instances is thoroughly and skillfully applied, and guaranteed not to wear off for one year.

From an electrical standpoint, the machine again proves far superior to the former one which we handled. The plates are of the newly discovered insulation material, *Electrite,* which enables the machine to give excellent results *under any weather conditions,* and we positively guarantee it in this respect. If directions, which accompany each machine, are carefully followed, success is always obtained. In place of wood handles and other non-conducting parts, we have used hard rubber, which improves the insulation, and the corresponding electrical output. The machine will give 2½ to 3 inch sparks under all conditions.

We cannot recommend this machine too highly, and unfortunately the illustration does but poor justice to the neat and trim appearance of the machine itself. It must be seen to be appreciated, and to notice the effect of the polished rubber and nickel-plated fittings. We will cheerfully refund the money if the purchaser fails to find the machine exactly as described and illustrated on these pages. We, nor any other firm, cannot be more sincere in our efforts to satisfy patrons.

Our machine is shipped *fully assembled,* and we guarantee to deliver it in good shape and working condition.

The size is 8 in. x 5 in. x 10½ in. over all.

The machine is guaranteed in all respects, and there is nothing to be replaced, as nothing can wear out. We will replace any part becoming defective, free of charge within one year if the machine has been treated with ordinary intelligence.

Naturally, all the interesting experiments as found in text books can be performed with our machine, such as: Interesting experiments in charging Leyden jars, experiments in resonance circuits, lighting Geissler tubes, attraction and repulsion of light bodies, firing powder or igniting substances, charging a person by standing them on an insulated platform, so that on being approached by other persons walking on the floor sparks can be drawn from any part of the face of the insulated person, or raise the person's hair by holding the hand over the head. There are countless experiments which may be performed, not only possessing value as means of studying, but furnishing plenty of entertainment as well. To persons not familiar with static electricity, we recommend our really excellent book, "Static Electricity," finely illustrated with 52 engravings, 88 pages, sent postpaid for 25c. It contains a variety of interesting experiments which may be performed readily with our static machine.

Send 2c. postage for our 8-page booklet describing the machine fully and giving lots of experiments.

To obtain the best results and satisfaction from the static machine, we have catalogued a list of special auxiliary apparatus, shown on the following page. The assortment is quite complete, enabling the most complicated and interesting experiments to be performed. This apparatus is especially designed for demonstrations in the study of electricity in colleges and schools.

If desired, the machine may be worked by our type "S" or other small motors, or if water power is available, by means of a water motor, enabling the experimenter to devote his entire attention to the experiments, instead of being obliged to turn the crank.

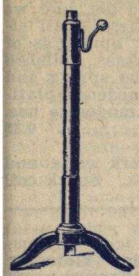
No. **9000** "Electro" Static Machine, new style, as described.....**$4.50**
No. **9010** X-Ray tube, to work on static machine..... **$2.25**

Note:—Our No. 9221-24 leyden jars can NOT be used with this machine.

Dear Sirs: **New Brunswick, N. J.**

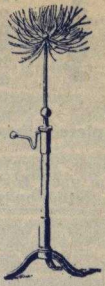
Received static machine IN PERFECT ORDER, and must say that IT IS WELL WORTH THE MONEY. **GEO. DELAPLAINE.**

STATIC AUXILIARY APPARATUS


9050

9051a

9053a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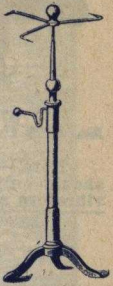

9056a

The following apparatus are introduced by us to further the study in static electricity and to provide the young experimenter who owns one of our static machines, with means of obtaining full benefit from same.

A MULTITUDE OF OTHER EXPERIMENTS THAN THE ONES ENUMERATED BELOW CAN BE PERFORMED WITH ALMOST EVERY ONE OF THE AUXILIARY APPARATUS.

THE FOLLOWING EXPERIMENTS AND INSTRUMENTS ARE FULLY DESCRIBED IN OUR STATIC MACHINE BOOKLET WHICH WE WILL SEND ON RECEIPT OF 2 CENTS POSTAGE.

No.		Price
9050	Universal Stand	$0.40
9051	Electric Chime, without Universal Stand	1.25
9051a	Electric Chime, with Stand	1.65
9053	Static Motor, without Universal Stand	1.00
9053a	Static Motor, with Universal Stand	1.40
9054	"Hair-Riser," without Universal Stand	0.25
9054a	"Hair-Riser," with Universal Stand	0.65
9055	Geissler Tube Attachment, without Universal Stand and without tube	0.20
9055a	Geissler Tube Attachment, with Universal Stand, but without tube	0.60
9056	Spinning Wheel, without Universal Stand	0.35
9056a	Spinning Wheel, with Universal Stand	0.75
9060	Brass Chains, one foot long, each	0.10
9061	Brass Chain, five feet long, each	0.25

Perth Amboy, N. J.

Dear Sirs:

I heard from a friend of mine that you have FINE GOODS, FOR THE MONEY, and I therefore wish you to send me your latest catalogue.

Yours truly,

MICHAEL ZETKOLISH.

6779

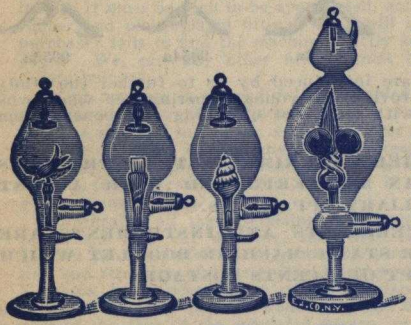
SMALL VIBRATORS.

In the past we have had a large demand for small current interrupters, such as are used on our medical coils, No. 1062, 1063 and 541, and we decided to list them separately. These small vibrators are well made; the vibrator spring is of best German silver. All parts are brass, polished and lacquered. Contacts on both the spring and the adjusting thumb screw are of hardened platinoid and will wear for years with moderate use.

No. 6779 Complete vibrator **0.35**

Note.—These vibrators are **not** large enough for spark coils and **should only** be used for medical coils or experimental work. Spark coil vibrators are listed on page 47-48.

Fancy Tubes



7007 7010 7047 7098

If the regular Geissler tubes, which through our efforts in introducing them in the U. S., are wonders, our new fancy tubes are unheard of marvels in the fullest sense of the word. We vouch that you have never seen such gorgeous color combinations when you look at one of our new fancy tubes in operation. The effect is really tremendous, and is utterly unthinkable if you have never given your eyes that exquisite color feast, only possible through one of these tubes.

So striking and fairy-like is the effect that we will unhesitatingly refund your money if you can conscientiously say that when seeing one of these tubes in operation that it is not the most marvelous color effect your eyes ever witnessed.

Several kinds are now imported by us—one a mineral tube, another a flower or butterfly tube, a porous shell tube (the latter lighting in dozens of different colors), etc. The butterfly tubes have the property to glow for several minutes in the dark in a weird fluorescent color, giving a strange effect, AFTER the current is shut off.

All fancy tubes stand up straight on glass pedestal. They work exactly like Geissler tubes; 6-8 may be run conveniently from a one-inch coil. There is nothing to burn or wear out in these tubes and they will last practically indefinitely.

No. 7007 Fancy tube, with butterfly **$1.15**
No. 7010 " " " minerals **1.15**
No. 7047 " " " porous shells **1.15**
No. 7098 " " " flowers (very striking) **1.35**

Kalamazoo, Mich.

Gentlemen:

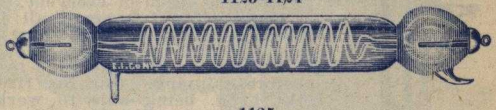
I have your catalogue out of which I have derived much information. I have bought a number of things from you, ALL OF WHICH WERE SATISFACTORY.

Yours respectfully,
GLENN VANDERVLIET.

Geissler Tubes.

The Geissler tube s a distinct novelty n the American narket. People ho see Geissler ibes in action for ie first time are o astonished by ie beautiful ef- ects obtained with ame that they ex- laim in wonder n d amazement. he color effects of iese tubes are so triking that it is npossible to de- eribe them. One ust have seen eissler tubes in ction to under- tand or appreciate ieir beauty. The ibes are filled with arious gases forced n after a vacuum s obtained, and the lass, which itself ontains fluorescent ilts, is made lum- nant as soon as a igh tension cur- ent flows through ie tube. Every ibe has a different attern and com- ination of different colors, and if they are used in quantities for deco- ative purposes, the most wonderful color effects imaginable can be btained. The more expensive tubes are filled with fluorescent liquids hich still further enhance the beauty of the various color combina- ions, as the liquids themselves create in turn new effects.

1123-1124



1125

Even the smallest spark coil will operate the largest tube.

We are at present the biggest importers of these tubes, and have lways a large assortment in stock. We invite prospective customers o call at our stores and inspect these wonderful creations of science.

121a	Geissler Tube 7 centimeters	$0.20	In 6 lots	$0.15
121	Geissler Tube 15 centimeters	.35	In 6 lots..	.30
122	Geissler Tube 20 centimeters	.45	In 6 lots..	.40
123	Geissler Tube 25 centimeters	.55	In 6 lots..	.50
124	Geissler Tube 30 centimeters	.65	In 6 lots..	.60
125a	Geissler Tube 7 CM. with fluorescent liq.	.30	In 6 lots..	.20
125	Geissler Tube 15 CM. with fluorescent liq.	.50	In 6 lots..	.45
126	Geissler Tube 20 CM. with fluorescent liq.	.60	In 6 lots..	.55
127	Geissler Tube 25 CM. with fluorescent liq.	.70	In 6 lots..	.65
128	Geissler Tube 30 CM. with fluorescent liq.	.80	In 6 lots..	.75

Dear Sirs: Brantford, Ont., Can.

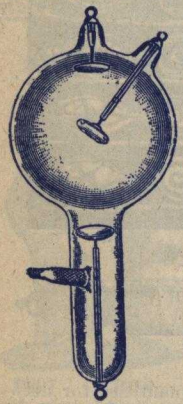
Have just received the 12 inch Geissler Tube, you sent me, AND I AM PLEASED WITH IT. THE COLORS ARE SPLENDID.

Yours truly, REG. H. MORTIMER

All these tubes are worked by simply putting the two wires leading from the secondary of the spark coil to the metal loops at the ends of the tubes; as soon as the coil is put in action the tube lights up. The effect is, of course, much more pronounced in the dark, and the student will find much interest in observing the "layer" light which is found in the interior of the tube.

Our tubes may be run for long hours continuously. They can never wear out as there is nothing to deteriorate. Therefore they last indefinitely.

A one-inch coil runs from 12 to 15 large tubes. Small or larger coils a proportionate number. When operated thus, tubes must be connected in series.



1129

X-Ray Tubes.

We make a specialty of importing X-Ray tubes for experimental purposes. These tubes if worked by coil No. 4366 or No. 1089 will take quite sharp photographs of the human hand, contents of a purse, etc. The time required for exposure is comparatively short. With the use of our Barium-Platinum-Cyanide screens the skeleton of a hand will be readily seen by placing the screen between the eye and the object to be examined. The X-Ray tube should be immediately behind the object.

The student will find much instruction and be able to greatly enlarge his knowledge with the use of this scientific apparatus, which we offer at prices within the reach of everyone.

Our X-Ray tubes are all imported direct from Germany, and are of the first grade. The anode is very strong and will last a long period. Every tube is thoroughly examined and tested in our laboratory before shipping. Our No. 1129 is the only tube in the U. S. being able to work satisfactorily on a 1½″ coil. Our No. 9010 tube works very well on a 1″ coil.

No. **9010** X-Ray tube 2″ diameter.....**$2.25**
No. **1129** X-Ray tube, 3 inches diameter, price..... **4.30**
No. **1130** X-Ray tube, 4½ inches diameter, price..... **7.50**

The above will prove very successful for ordinary experiments.
Prices for larger tubes on application.
These tubes should only go by express or freight.

Fluoroscopes.

These are intended to make the X-Rays visible to the naked eye. If an object is shown before the screen and in front of the X-Ray tube, the outlines will readily be seen projected on the screen. The bones of a hand, for instance, can be observed easily with the use of these fluoroscopes.

No.		Price
1131	Fluoroscope with Barium-Platinum-Cyanide Screen	$3.50

See cut on next page.

Dear Sirs: **Evansville, Ind.**

Find enclosed 4c in stamps for which please send me your latest catalogue, and your order blank. I have ordered goods through my friend and WAS VERY PLEASED WITH THEM.

Very truly yours, ARTHUR MOGGE.

BARIUM-PLATINUM-CYANIDE SCREEN.

These are the same as used with No. 1131 Fluoroscope. They represent the screen alone, which is mounted on a polished mahogany frame. To be used in the dark only. Size 3 x 5 inches.

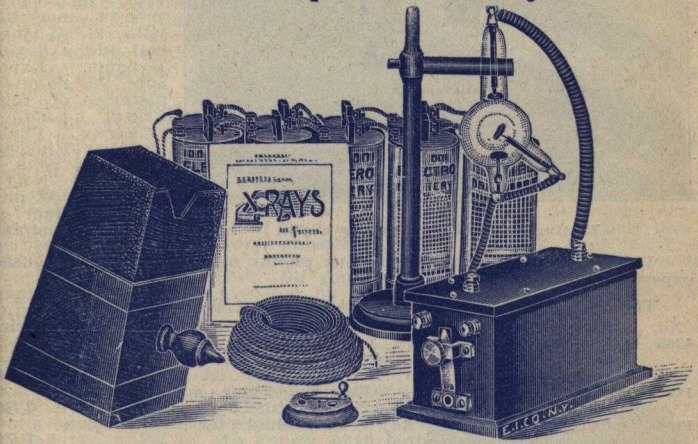
No. 1284 Barium-Platinum-Cyanide Screen on frame, price each, **$3.00**

TUBE STANDS FOR X-RAY TUBES.

These stands are made of iron and have every possible means of adjustment. They are light and can be placed on a table or in any convenient position when lighting the tubes.

No. 1132 Iron Stand for X-Ray Tubes, see cut below.....**$1.25**

The "Telimco" Experimental X-Ray Outfit



1292

This apparatus is a very practical little set, and can be put to a variety of uses. We are so far the only firm in America to put on the market a practical experimental X-Ray Outfit at such a low price. This is mainly due to the fact that it has heretofore been impossible to produce an X-Ray tube that could be worked on a small coil and at the same time consume but little current. The usual tubes only work on a 4 to 6 inch spark. Ours, on the contrary, works with only 1½ inch spark. Our special tube is manufactured in Germany after our own plans, and we are the only importers and distributors of same in the United States. The coil which goes with this outfit has been especially constructed for X-Ray work, and is provided with new French vibrator giving extremely fast vibrations. The Platinum-Barium-Cyanide Screen is of German make and is imported solely by us. It will last for years, if cared for as per our instructions, as there is little or no deterioration.

We earnestly hope that our new outfit will enlighten lovers of science on the somewhat obscure subject of the Cathode Rays and that it may also help to bring forth new discoveries.

Raleigh, Tenn.

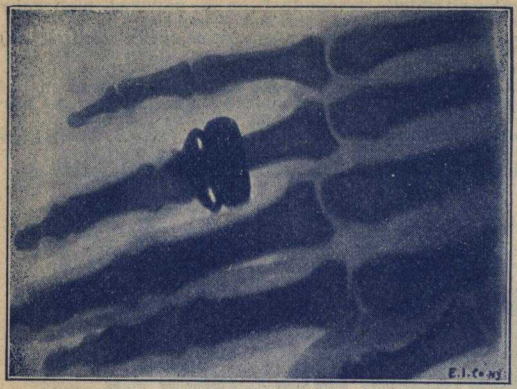
Dear Sirs:

I received the goods that I sent for ALL O. K.

Yours truly,

W. N. BRIGGS.

What You Can Do with Our Outfit



Radiograph made with our outfit.

Cut shows reduced X-Ray photo of right hand of Mrs. J. M. Rolston, of 1803 Lansdown St., Baltimore, Md. Photo was made by Mr. Rolston. He used our No. 1129 standard tube in connection with a 1¼ inch coil and a 6 volt Dynamo. Exposure 10 minutes, distance of tube from hand, 5 inches. Photo plate, 8x10 inches, current, 5 volts, 2 amperes. Note sharpness of picture, outline of bones, wedding and diamond rings.

This is only one of the numerous photos we receive from enthused experimenters using our goods.

The "TELIMCO X-Ray Outfit" consists of the following:

No.		Price
4366	1½ in. especially wound X-Ray Induction Coil with condenser, "Bull Dog" type, with French vibrator operating from end of coil	$7.50
1129	Imported Low Tension X-Ray Tube, 8 c. m., constructed for light current	4.30
1132	Double Adjustable X-Ray Tube Stand, for holding tube in any position desired	1.25
1131	Barium-Platinum-Cyanide Fluoroscope, 3 x 4½ in. (for rendering the X-Ray visible to the eye)	3.50
1310	Single Pole, S. T. Porcelain Base Switch	0.14
	Coil of extra insulated wire for connections, together with 8 Electro battery connectors	0.35
	10 Extra High Amperage "Columbia" Dry Cells for connection in series multiple, each 23c	2.30
	"X-Ray for Everybody," by Edw. Trevert, 95 pages and ill.	0.50
1292	COMPLETE OUTFIT, as above	19.75

Full and explicit directions are furnished with this outfit.

This outfit is powerful enough to show quite clearly the skeleton of a hand, coins within a leather purse, or any metal object through 1 to 1½ inches of pine board.

The outfit is up to date in every particular, and will prove an invaluable acquisition to the physical laboratory of any school, college, physician or electrical experimenter.

Dear Sirs: **Santa Clara, Cal.**

I received the goods last Monday. THE SHIPMENT ARRIVED O. K. These articles, together with those ordered about two months ago, ARE GIVING PERFECT SATISFACTION. I shall UNHESITATINGLY RECOMMEND your apparatus to any experimenter who desires HIGH CLASS INSTRUMENTS AT REASONABLE PRICES.

Yours truly, J. C. BOYTER.

"Electro" Lighting Plants

Adapted to launches, automobiles, private houses, moving picture theatres, shows and bungalows.

We have been literally flooded with inquiries for prices on complete electric lighting plants for various purposes, and so have finally developed a new and improved line embodying the most up-to-date principles and eliminating the weak points of all others.

These lighting plants are used for many purposes, such as lighting automobiles, launches, private houses, bungalows, camps, tent shows, etc.

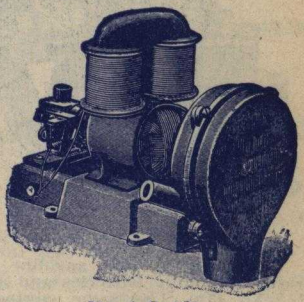
These outfits should of course be used in connection with our marvellously efficient Tungsten filament lamps, which give 1 C.P. for every watt delivered by the dynamo. We have spared no expense in getting together the very best of reliable apparatus for this work. The dynamo is the same as used by the U. S. Government, as is also our special air-cooled 2 cycle gasoline engine.

The storage battery is our well known "Electro" 6 volt 60 ampere hour type, and on the larger size plants any number of them can be connected in series or multiple to give the desired output. An automatic cut-out of the magnetic type has been developed for automatically preventing the storage battery from discharging back through the dynamo, if the latter's speed and consequently its voltage, falls below that of the battery at any time.

Electric lights are the safest and most convenient illuminant known to man, at the present time. Their cost is lower, all things considered, than other forms of illumination; oil lamps are extremely dangerous and moreover very unhealthy. Do you know that one gas light, consumes as much oxygen in one hour from the air in a room, as six full grown people? Do you know that more fires are caused annually, by the careless use of matches, oil lamps, etc., than all other causes put together? This is a fact proved by Insurance and Fire statistics.

In figuring on lighting outfits the following rules will be of service. The watts are obtained by multiplying the volts by the amperes. Conversely, the volts or the amperes, are found by dividing the watts by the known quantity. About 2.6 volts dynamo voltage should be allowed for each storage cell to be charged in series. On dynamo outfits without batteries, the lamp voltage should correspond to that of the dynamo. On battery and dynamo outfits combined, the lamp voltage should be the same as that of the battery.

We have arranged our lighting outfits in various combinations of equipment, so that practically all ordinary requirements are covered. The individual apparatus is also listed separately, so that the engine, dynamo, etc., may be purchased as desired by the customer.



No. 1 Outfit.

Dear Sirs: **Worcester, Mass.**

The material which I ordered of you was received this morning. EVERYTHING SATISFACTORY. Please accept my thanks for the PROMPTNESS WITH WHICH THIS ORDER WAS HANDLED.

Respectfully yours, WM. H. ALLISON.

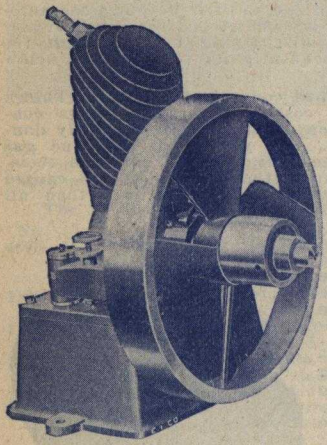
No. 1. 9 Light, 75 Watt, Lighting Outfit

A complete Hydro-Electric Plant, similar to the large plants in use throughout the United States and abroad. A perfectly built and self-contained unit, mounted rigidly on common iron bed-plate. The dynamo is very powerful and develops 25 volts and 3½ amperes on 90 lb. water pressure from an ordinary ¾" faucet. On 70 lb. pressure, the output is 20 volts and 3 amperes, etc. At full capacity the dynamo will light 9 to 10, 8 C.P. tungsten lamps. The water motor is strongly built, and the dynamo is supplied shunt wound, suitable for recharging storage batteries. The shipping weight of the outfit boxed is 34½ lbs.

No. 1 Hydro-Electric Plant, complete. Price.....**$16.00**

No. 2. 19 Light, 150 Watt, Lighting Outfit

This outfit is the most flexible, and widely adaptable outfit we list. It forms an ideal plant for motor boats, automobiles, bungalows, camps, etc. The capacity of 19 lights is for the dynamo and engine, considering 8 C.P. 8 volt tungsten lamps being used. The outfit with 1 No. 555 storage battery (see page 82) can light 6 to 7, 6 volt, C.P. tungsten lamps for from 7 to 8 hours. The dynamo can easily recharge 2 No. 555, 60 A.H. batteries at once, and these 2 batteries would give twice the above C.P. output on discharge. The dynamo is shunt wound and very finely built, for constant duty.



No. 4600 ¼ H.P.

The gasoline engine is a newly developed air cooled type, which has been adopted by the U. S. Government for many purposes including the driving of wireless generators. It is well made in every particular and develops ¼ H.P. easily, with speeds variable from 800 to 2000 R.P.M. Its net weight is 23 lb. and it measures 12½" high, by 1 sq. ft. floor space. Cylinder has 1¾" bore by 1¾" stroke. The flywheel has a diameter of 8", the pulley a diameter of 1¾". It is air cooled by a fan built on the flywheel. 2 cycle type, jump spark ignition. Fuel tank in base. Shipping weight 35 lbs.

No. 4600 ¼ H.P. gasoline engine, complete with all ignition apparatus, including batteries and also muffler.....**$23.00**

No. 4610 The same engine but ½ H.P. with all ignition apparatus.....**$35.00**

No. 4620 Special 150 watt, 8 volt, 19 ampere, 2200 R.P.M. shunt wound dynamo. Price, complete with pulley.....**$29.00**

No. 4630 Automatic magnetic cut-out mounted on composition switchboard for preventing storage battery discharging back through dynamo. Price.....**$9.00**

NO. 2. COMPLETE ELECTRIC LIGHTING OUTFIT.

Consisting of above No. 4620 150 watt dynamo, No. 4600 ¼ H.P.

Dear Sirs **Leominster, Mass.**

I have received the bill of goods IN O. K. CONDITION. Thanking you for YOUR KIND INTEREST IN MY SMALL ORDER, I remain,

Yours truly, LELAND C. BLOOD.

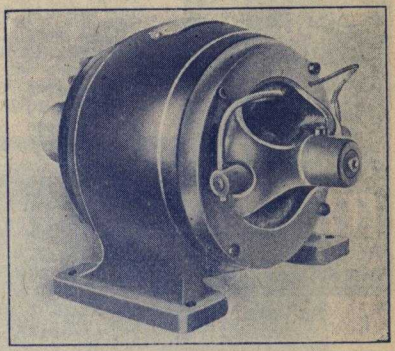
gasoline engine, No. 4630 automatic cut-out, and No. 555, 6 volt, 60 ampere hour storage battery, capable of lighting 6 to 7, 6 volt 6 C. P. lamps or their equivalent for 7 to 8 hours at each charge; 12 ft. 1" leather belting.

No. 2 Complete outfit as described.....$70.00

No. 3. Complete Electric Lighting Outfit

The same plant but with 2 No. 555 batteries giving twice the above candle power 7 to 8 hours, or the same C.P. for twice the above time in hours.

No. 3 Outfit complete, $78.00



No. 4620. 150 Watts.

No. 4. Complete Electric Lighting Outfit

For those having motive power at hand, such as in motor boats, automobiles, and the like the following outfit will be sufficient and very adaptable.

Outfit consisting of above No. 4620 generator, No. 4630 automatic cut-out, one No. 555 storage battery and 12 ft. 1" leather belting.

No. 4 Complete outfit as described. Price.....$46.00

No. 5. Complete Electric Lighting Outfit

This is our best outfit. It is the best that brains can build, the best that money can buy. We guarantee that this outfit will give satisfaction in all respects whatsoever.

Capacity 19 lights, 150 watts.

This outfit consists of:—

1 No. 4620 8 volt, 19 ampere, 150 watt D. C. dynamo, 2200 R. P.M. shunt wound	$29.00
1 No. 4640 oak switchboard containing 1 No. 4630 automatic cut-out; 1 No. 1037 voltmeter, 1 No. 1039 ammeter (Style A); 1 No. 5000 field rheostat; 1 No. 1286 voltmeter switch; 2 No. 8001 switch blocks and fuses	18.00
1 No. 4600 ¼ H.P. air cooled gasoline engine, complete	23.00
1 No. 555 storage battery	8.00
4 extra fuses	0.20
60 ft. No. 10 R. C. S. B. copper wire, making (4 mains 15′ long for generator and battery lines)	2.00
15 ft. No. 14 R. C. S. B. copper wire for field rheostat line	0.24
No. 4650 12 ft. 1" leather belt	1.50

Gentlemen: Yates, N. Y.

I wish that all of my instruments WERE THE E. I. CO.'S MAKE, AS THEY ARE FULLY SATISFACTORY.

Yours truly, JAS. E. JONES.

1 hydrometer 0.30
1 set plans for installing plant.

No. 5. Complete electric lighting outfit as described.....$82.00

List of Electric Lighting Supplies

No. 4640

We list below the more common electric lighting supplies which we stock. These goods are of the best quality in every case and we guarantee full satisfaction.

No. 8002 Cotton covered New Code Lamp Cord No. 18 B. & S. Gauge. Price per ft. $0.01½

No. 8005 Cotton covered New Code Lamp Cord No. 16 B. & S. Price per ft.....$0.02

No. 8006 Single braid Weatherproof Rubber Covered No. 14 B. & S. wire. Price per 100 ft. $1.60

No. 8007 Double braid Weatherproof Rubber Covered No. 12 B. & S. wire. Price per 100 ft. $2.50

No. 7008 Rubber Covered Fixture Wire, No. 16 B. & S. Gauge. Price per 100 ft..$1.20

No. 8001 Main line switch and cut-out, with 2 fuses. Price.....$0.45

Small Switches. See pages 139-141.

Lamps, 6, 8 or 12 volt Tungsten, high efficiency type. See page 120-122.

Receptacles; Candelabra and Miniature. See pages 116-119.

Small switches: See pages 139-141.

No. 4700 Standard 250 volt, approved, 5 ampere snap switch. Price $0.25

No. 4701 Standard 10 ampere, 25 volt rating snap switch. Price. $0.45

No. 4702 Standard Edison base, approved, brass key sockets for ⅛-inch pipe. Price $0.34

No. 4703 Porcelain Ceiling Rosettes for drop lights, approved. Price. $0.25

No. 8003 Separable Attachment Plugs. Price $0.15

No. 8004 Edison Plug Fuses, 5, 10, or 20 ampere. Price.....$0.05

Friction tape (black) and solder—see page 185.

Cleats, Knobs, etc., of Porcelain. Regular type. See pages 156-157.

NOTE:—For the guidance of our customers, we have prepared a very simple and comprehensive blue-print showing the complete lay-out and all wiring connections, which is given gratis with all complete Electric Lighting Plants. For those who may wish a copy of this blue-print of valuable data, we send it postpaid at 10 cents.

If you are in doubt which of our lighting outfits is the most suitable for your purpose write us fully how you intend to use it. We gladly solicit your correspondence.

Dear Sirs: **So. Omaha, Neb.**

Received the goods I ordered a few days ago, AND AM FULLY SATISFIED. I am glad to know you, AS YOUR LOW PRICES BEAT ALL OTHERS. Please send me your latest catalogue.

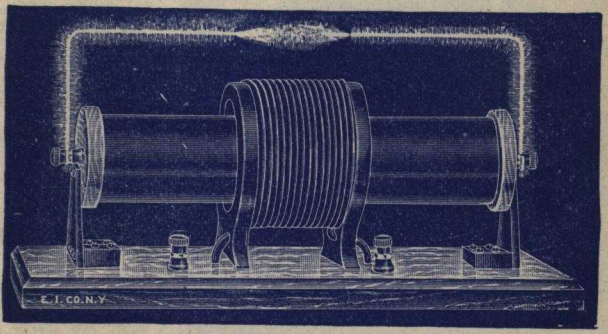
Yours truly, DR. SCHUEE.

The "Electro" Tesla Transformer

(Patent applied for)

The pressing demand of our customers for an efficient Tesla Transformer has
mpted us to add this wonderful piece of apparatus to our now extensive list
experimental goods. We hardly need mention that the Tesla Transformer is
most marvelous piece of apparatus ever invented and there are so many
usands of experiments and demonstrations that can be performed with this
paratus, that it is not used merely as a pastime, but its fascination will never
se to attract its owner.

We have had this transformer under consideration for the last two years and
had to build dozens of different models before a perfect apparatus was pro-
ed. We do not hesitate to say that for the price we are asking this apparatus
the greatest bargain ever offered by us. Although it is now the lowest priced
la Transformer in this country it does not mean that it is less efficient than
costing $50, but as we are manufacturing the transformer in very large quan-
es it is possible to greatly reduce the cost. Naturally the manufacturer who
y builds one or two at a time must ask a great deal more than we, making
0 and three hundred at a time.



No. 7000

The construction of this transformer has been simplified to such an extent that
s not only absolutely "fool proof" but we guarantee that it will do anything
everything any standard Tesla transformer ever did, or will do.

The primary is wound with the best imported Pirelli cable and the secondary
h the best *DOUBLE INSULATED* enameled wire. The secondary is insulated
solid hard rubber brackets as shown in cut. It is also provided with two
l finished coil ends. The insulation is absolutely perfect, the base is heavy
rtered oak. Our usual hard rubber binding posts are attached as shown.

The Tesla Transformer is nothing but an apparatus which steps up the voltage
the secondary of a spark coil, to many hundred times its original value.
t is this incredibly high voltage that produces the wonderful phenomena, espe-
lly those that you have seen performed on the stage by some clever electrician,
of which can be duplicated with our transformer.

Size of base, 16 in. by 7 in. Height over all, 6½ in. Weight, 4 pounds.

The "Electro" Tesla Transformer can only be operated in conjunction with
following apparatus, *it is of no value without them*:
°, a spark coil or transformer coil; 2°, a set of condensers; 3°, a spark gap.
of our 1 in. spark coils is sufficient to operate the transformer, but we

---

Concord, N. H.

ar Sirs:

Received order IN SATISFACTORY SHAPE this morning.

Yours respectfully,

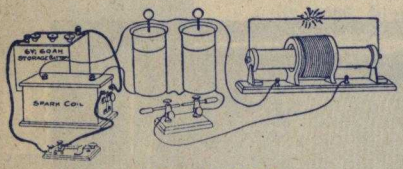
CHAS. H. L. DUDLEY.

would always recommend to get a 2 in. coil with which the best results are to be had. Or else our ½ K. W. transformer coil in connection with our Electrolytic interrupter will still give more wonderful effects. Two of our 1½ pint Leyden jars No. 9222 or any other sending condenser of the RIGHT CAPACITY can be used in connection with this transformer. A single spark gap completes the entire outfit. IT MUST BE UNDERSTOOD THAT THE TESLA TRANSFORMER CANNOT BE USED WITHOUT THE ABOVE MENTIONED ACCESSORIES.

To get perfect results and to obtain the best possible effects we would greatly recommend the following outfit:

No. 7000	"Electro" Tesla Transformer.....	$5.50
No. 1089	Spark Coil, 2 in.	9.75
No. 9222	2 leyden jars	2.00
No. 9220	spark gap	.60
No. 7001	Outfit complete .....Total	17.75

OPERATION.



WIRING DIAGRAM

The connections are first as shown in diagram. It is of highest importance that the connecting wires from the secondary of the spark coil to the Tesla Transformer and to the condensers, are heavy (not less than No. 14 B & S). There should be as little wiring as possible, no loops, or coils, and if possible all wires should be of equal length.

When connections are made as shown start operating. First test for spark length of the Tesla, by attaching two stiff, copper or brass wires to the secondary coil leads (see illustration No. 7000). Leave a gap of about 2 inches between the two wires. Then start the coil. If the Tesla spark is not long enough, the spark gap must be adjusted, until best results are obtained. It is highly important that the zinc spark gap has POINTED ENDS. Plugs with flat ends cannot be used. After a few minutes experimenting the right Tesla spark is obtained. It gives a cracking prattling noise, which becomes louder and louder as the spark in the zinc spark gap is lengthened.

It is understood that all Tesla experiments should be performed *in absolute darkness*, as only then the right results are obtained and their full weird beauty shows off to best advantage.

As soon as everything is adjusted and the apparatus is working, the two wires leading from the secondary (Fig. 7000) give a blue brush all along the wires. This works best of course when there is no spark discharge between the wires.

Next take off all wires from the Tesla Secondary, which we will call T. S. hereafter. Operate apparatus and both coil ends of the T. S. will show the "Fire Wheel." The brush composing the wheels actually turns in unison with the interruptions of the spark coil.

Next take a piece of metal (anything will do), and, holding it in your hand, approach one of the T. S. Immediately you will observe a large brush as you approach. If you approach still nearer a spark from 2 to 3 inches long will jump into the metal piece without you experiencing the slightest Sensation.

Altho the voltage of such discharge runs into the hundred thousands, it is not harmful, as the Tesla currents run on the surface only, never penetrating deep.

A spark can also be drawn with the bare hand without harm, altho it stings a little.

Touch one of the T. S. with a piece of metal which you hold in your hand.

Islersford, Me.

Dear Sirs:

Have received my order and thank you very much IN GETTING IT HERE SO SOON. Everything came and I AM MUCH PLEASED WITH THE GOODS.

Sincerely yours,

E. T. WILLARD.

With the other hand approach slowly and carefully the other T. S. About 4 or 5 inches away from it, a large beautiful brush will be drawn from the hand, very weird in character.

Geissler and Tesla tubes light up when brought near the Tesla Transformer, without actually touching any part of it. They are usually operated by holding one end of the tube in the hand and drawing a spark into the other end of the tube by approaching one of the T. S.

Ground one of the T. S. and attach a piece of wire to the other T. S. An enormous brush will be observed on the free wire.

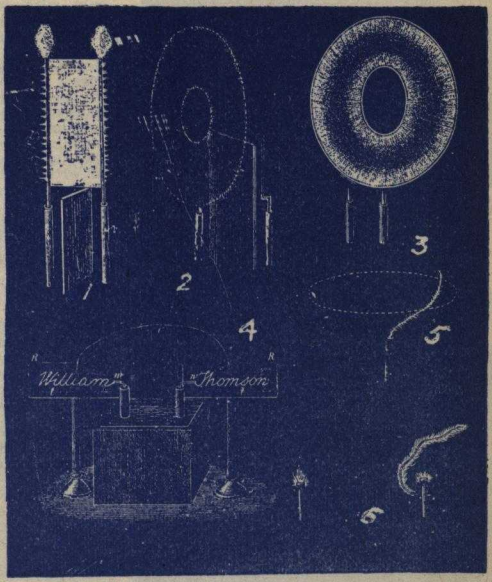
Another interesting experiment is performed by running two fairly stiff copper wires parallel to each other and about 2-4 inches apart (Fig. 1.)

When the frequency is high enough the space between the wires will be filled with light, while the ends will show a flame-like discharge. Small flames are also playing continuously on both sides of the wires. This experiment is very impressive.

Two rings formed of copper wire, the smaller ring placed into the larger one, and both connected to the poles of the transformer, will show a very pretty discharge (Fig. 2).

A similar experiment is performed by forming two stiff wire loops, of heavy copper wire. The large loop is 80 centimeters in diameter, the small loop measures 30 centimeters.

The two loops are placed concentrically, one into the other, and both are in the same plane. The space between the two loops will be filled with light when the coil is in operation (Fig. 3.)



TESLA EXPERIMENTS

A very striking effect is produced by the experiment shown in Fig. 4.

R, R, represent two hard rubber sheets, about ¼ inch thick. A thin silk covered wire, No. 36, B. & S., is glued in form of a name or characters on the face of each sheet. The back of the sheets is covered with a piece of tinfoil, t., t. Both are connected by a thin wire, C.

The terminals, W, W, of the transformer lead to the name or characters, as clearly indicated in the illustration. The wires in this instance emerge from a box filled with oil.

Philadelphia, Pa.

Dear Sirs:

I received EVERYTHING O. K. today. I think THEY ARE GREAT, and I hope to have another order ready for you in a few weeks.

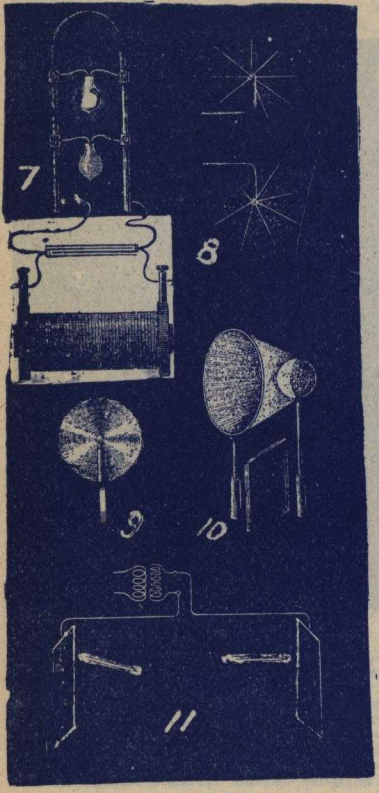
Yours very truly,

WILLIAM McHUGH.

The frequency of the transformer is now regulated (by adjusting spark gap and vibrator of coil) till the thin wire pasted on the hard rubber begins to emanate light. After a little experimenting the point will be found where the same or characters will stand out brilliantly, producing a very pretty effect.

Fig. 5 shows another interesting experiment which, when produced in the dark, is quite impressive. A very thin, bare copper wire attached to one end of the transformer, rotates in a circle. The length of the bare wire must be ascertained by experiment.

A short piece of thin, cotton covered copper wire when attached to one end of the transformer is enveloped in a beautiful light discharge (Fig. 6.)



TESLA EXPERIMENTS

Possibly the most puzzling experiment to the individual acquainted only with low tension work is the phenomenon of the impedance. The meaning of this word is "seeming resistance." If we short-circuit an electric lamp by means of a heavy wire, we would hardly expect that we could light up the lamp thus short-circuited, under ordinary circumstances. By means of Tesla currents, however, we can light up several lamps, despite their being shorted with a heavy (No. 8 or 9) wire.

The arrangement is shown in Fig. 7. One or more 20-volt lamps are made to slide up and down on a heavy copper wire loop. This loop is connected on one side to the Tesla transformer, bridged by a large condenser (Leyden jar). The other wire from the condenser terminates at a brass ball. Another similar ball is placed opposite the first one and is connected to the wire loop.

In operation intense white sparks jump between the balls. By moving the lamps up and down the loop, the highest degree of incandescence is quickly ascertained.

Experiments with the impedance will come out best when the wire of the loop is very heavy. A copper rod even ½ inch thick bent into shape as shown in Fig. 7 will give excellent results.

The electrical Phanton is shown in Fig. 8. This experiment is a very odd one and completely mystifies the layman. Two thin metal discs about 1 inch in diameter have their circumferance ground to very sharp edges; the sharper the better. These two discs are connected direct with the two poles of the transformer.

As in this case, bodies of very small capacity are connected with the transformer: same is in the position to develop extremely fast vibrations.

Wilwaukee, Wis.

Dear Sirs:

The order has been received in perfect condition for which please accept my thanks. You may be sure to receive another order soon.

Yours respectfully,

J. C. LUSTIA.

When the potential is high enough, white threads or light rays break from the edges of the discs. These rays are sometimes of considerable length.

If one holds the hand against them, nothing will be felt; even if the hand is brought quite close to one of the terminals, only a small spark will jump from it.

The "electrical wind," which is observed on all static machines, can also be produced with the Tesla transformer if its potential is sufficiently high. A small, sharp teethed—metal disc—preferably of aluminum and about 1-64 inch thick, when placed upon an axle upon which it can turn with practically no friction, will revolve with incredible speed as soon as the transformer is operated.

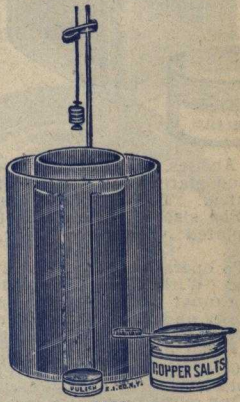
Sparks will fly from the edge of the disc and very often it will be entirely enveloped in light (Fig. 9).

A circle of copper wire is made (Fig. 10) which is connected to one pole. The other pole carries a brass ball, its diameter being approximately ¼ of that of the circle. As soon as the transformer is started, the discharge takes place between the surface of the brass ball and the rim of the circle. A hallow cone of light is formed, presenting a weird appearance.

The ideal method of an illumination, according to Tesla, is shown in Fig. 11. Two large metal plates are suspended and are connected with the high frequency coil. Vacuum tubes, having no metallic connections whatsoever, when placed between the plates, light up vividly.

No. 7000 Electro Tesla Transformer as described, **$5.00**

"Electro" Copper Plating Outfit.



4400

With this we are presenting something altogether new to our customers. This little copper plating outfit is not a toy by any means, but can be used to thoroughly copperplate objects up to 2"x6¼", or any smaller sizes. Not only small metal parts may be thoroughly plated, but a thousand other objects such as beetles, pieces of lace, wooden models (to make them act as metal models), plaster of paris casts, to make electrotypes, to copperplate glass, etc.

The important claim we make is that the plating is deposited uniformly all over the object, and will not vary in thickness.

There is no battery or any other source of electricity necessitated with this outfit, as the outfit is a battery itself. As soon as you lower the object into the solution, the plating commences and will continue until the electroplating salts are entirely used up; the battery never loses its power until all salts are deposited. The longer the object is left in the solution, the heavier the plating will be. A few trials will quickly make you an expert. It is understood that quite a few objects can be copperplated all at the same time, in fact as many as the jar will hold.

There is quite a demand today for metalized beetles, insects, nuts, fruits, flowers, etc., etc., all of which can be turned out to perfection with our outfit at a large profit

---

Winnipeg, Man.

Dear Sirs:

I will not fail to RECOMMEND YOUR GOODS TO ARL MY FRIENDS. Thanking you for your kindness in the past, I am,

Yours sincerely,

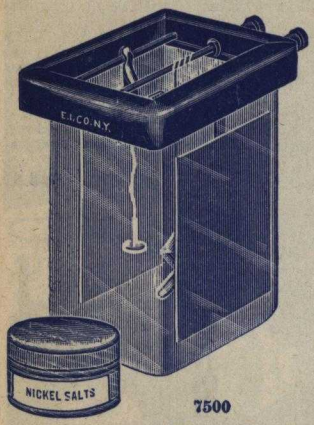
ALEX. POLSON.

"ELECTRO" COPPER PLATING OUTFIT (Continued).

Explicit printed directions are furnished (only) with each outfit. We also furnish 1 box of polish and 1 brush free of charge. The outfit comes complete with all salts and is ready for use as soon as unpacked. Size overall 13"x5¼".

No. 4400 "Electro" Copper Plating Outfit, complete..... **$1.25**
Copper plating salts, per lb..... **0.15**

"Electro" Nickel Plating Outfit.



7500

We pride ourselves to be the first concern in this country to offer for sale a small nickel plating outfit within the reach of everybody.

Please do not take this outfit for a toy, as it is able to do all kinds of small work just as thorough as any nickelplater could do it.

It does not differ in any respects whatsoever from commercial outfits, except in size. If you live in a small town you can earn quite a little during your spare time by nickelplating small objects for which work there is always a ready demand.

Our outfit for neatness and efficiency is unmatched. It has two heavy nickel Anodes, heavy suspension frame resting on the glass tank and three connection rods. The object or objects to be plated are hung by means of copper wires, on the central rod, and as there are two Anodes, **a uniform, fine deposit is obtained** that cannot be matched. A good plating can be had within 15 minutes, heavier plate from 20 to 30 minutes. The Anodes are quite heavy and will last for months.

The size of the tank is 3¾"x4"x6" and the largest object that can be plated with this outfit should not measure over 3¼"x2½"x5".

To operate the outfit we recommend 3-4 of our No. 10050 Gordon Batteries. With these the outfit can be worked for a long period. Dry cells cannot be used under any circumstances. Any battery giving from 3-6 volts and from 5-10 amperes STEADY CURRENT can be used.

Complete printed instructions come with each set.

If you do not care to polish the work by hand we recommend our No. 6021 Polishing Head (Page 178). You will then have a complete commercial outfit and you can turn out work rapidly.

Our outfit is greatly recommended to jewelers, schools, repair shops, garages, electricians, and all those desiring to turn out nickel plating at a ridiculously low price.

No. 7500 "Electro" Nickel plating Outfit (without batteries), complete..... **$2.25**
No. 7501 Extra Anodes, each..... **0.60**
No. 7502 Extra Bottle Nickel Salts, each..... **0.40**
No. 7503 Extra Glass Tank, size 3¾"x4"x5", each..... **0.40**

Muy senores mios y amigos: **Patzeuaro, Mex.**

En atencion al contenido de su atenta postal fechada el 1: del presente mes, formo la presente para manifestarles que ya recibi y de entera conformidad el pedido que estaba pendiente y que segun me manifiestan Uds. enbarcaron el 28 de abril proximo pasado.

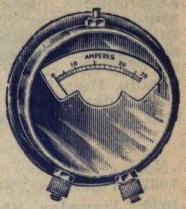
Dadoles a Uds. las gracias por su eficacia me es muy grato repetime de Uds. affmo. atto. S.S. y amigo. **J. JESUS BARRIGA.**

"Electro" Pocket Volt and Ammeters

These little instruments are without doubt the most compact and durable meters ever produced in this country. They are not alone extremely accurate, but they are also "dead beat," all metal construction. The finish is the finest ever seen on a domestic instrument.

Permanent magnet type indicates polarity as well as current. **GUARANTEED FOR ONE YEAR.**

It is the smallest meter made, diameter 2¼ inches, 4½ oz., shipping weight 9 oz. Flexible, detachable lead, with contact pointer furnished free. Voltmeters, 8 volts. Ammeters, 30 amperes; combination, 8 volts, 30 amperes.



4301

No. 4300 "Electro" ammeter, as described, each.....$1.20

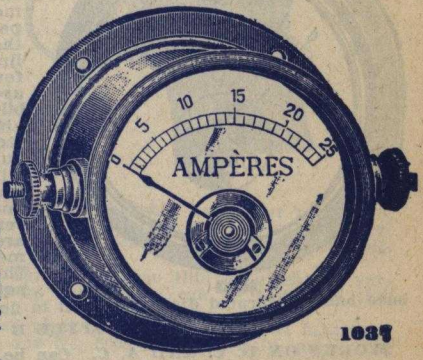
No. 4301 "Electro" voltmeter, as described, each.....$1.25

No. 4302 "Electro" Volt ammeter, 8 volts, 30 amperes.....$1.50

Volt and Ammeters.

STYLE A

As it has been found that in most of the cheap volt and ammeters now on the market, the registry of current is either too high or too low, we have gone to considerable expense and spent much time in experiments in order to get instruments which can be depended upon for accuracy under all conditions. The Volt and Ammeters which we offer below will be found superior to anything heretofore to be had at much higher prices. These instruments are all imported by us direct from France, and are made up after our own plans and specifications.



1037

The damping of these instruments is very energetic, as the needle will come to a standstill in an astonishingly short time and will not, as in many other meters, oscillate for a long period before showing correct value

---

Gentlemen: Bakersfield, Cal.

Your articles are A1 and YOUR PRICES LEAVE NOTHING TO BE DESIRED by the amateur with a short pocket-book. I have set up a couple of the small meters purchased from you some time ago, on a small switchboard, and besides giving the BEST OF SERVICE, they add very materially to the APPEARANCE of the other apparatus. The ½-inch coil and tubes purchased of you OVER A YEAR AND A HALF AGO STILL GIVE FINE DEMONSTRATIONS.

Yours respectfully, O. BICKERDIKE.

Our Voltmeters of the style "A" should be used on switchboards, automobiles, motor-boats, etc., and register from 1-25 volts. The Ammeters register from 1-25. The crystals are very thick and will not fall out if handled roughly. The inside windings throughout are of silk covered, finest copper wire, and short circuiting is impossible. The springs are Swiss watch spirals of the best grade obtainable, and the needle, therefore, will always positively return to zero after action. All these instruments are entirely nickel plated in a thorough manner, and will not run "brassy" for years.

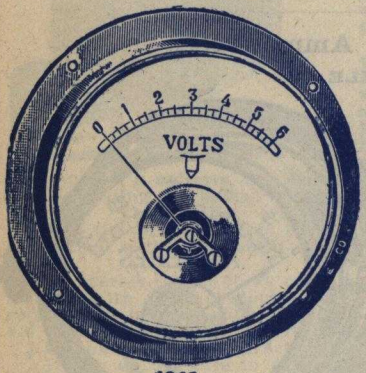
STYLE A

No.		Price
1037	Voltmeter, Style A, Volts 1-25, 2¾ in. face	$3.00
1039	Ammeter, Style A, Amps 1-25, 2¾ in. face	3.00

WORKS ON D. C. AND A. C. Can be left in circuit continuously.

Volt and Ammeters.

STYLE B



1041

These instruments are of a lighter type than the ones mentioned above, and are to be used where not much space is available. The thickness of these instruments is, when mounted, ¼ inch. They are especially adapted for use where they have to stand rough handling, and they will always be found to register correctly. They are used extensively in automobiles, small motor launches, movable wireless telegraph stations, etc. They have no binding posts, but there are two flexible silk wires in the single instruments, leading out from back of meter, and connections can be effected very easily. The working parts are the same as the Style "A" meters, but on a smaller scale. These little gauges, which should not be judged by their low price, have hand calibrated dial. Finished in finest nickel plate.

STYLE B

WORKS ON D. C. AND A. C. Can be left in circuit continuously.

No.		Price
1041	Voltmeter, Style B, Volts 1-12, 2½ in. face	$2.00
1041A	Ammeter, Style B, amperes 1-15, 2½ in. face	2.00
1042	Combined Volt-Ammeter, Style B, volts 1-12, amperes 1-25, 2½ in. face	3.00

Philadelphia, Pa.

Gentlemen:

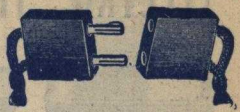
Please send me your latest catalogue. All my previous orders have been FILLED IN A SATISFACTORY MANNER; and I therefore wish to continue patronizing your company. Hoping to receive this catalogue as soon as possible, I remain,

Respectfully yours,

HARRY B. ABBOTT.

CONNECTORS

These handy connectors are used a good deal to make any sort of temporary connection and its use will be plain to everybody. Used especially to connect Wireless Head Sets to the instruments. When through receiving messages, pull connector apart and put phones away. There are, of course, hundreds of other uses.



7590

No. 7590 Separable Connector, complete each **$0.35**

The "Electro" Revolver Flashlight

No. 7199

At last something new under the sun! Here is a highly useful article that kills two birds with one shot! It is the cleverest imitation of a modern revolver which you ever saw, but at the same time it is one of the finest flashlights that has ever been produced.

You pull the trigger and lo—out shoots not a bullet but a powerful shaft of brilliant white, dazzling light. To all intents and purposes, however, it looks like a murderous gun and the burglar don't live who cannot be bowed instantly with this flashlight. It is highly useful for watchmen, clerks, farmers, etc., in fact anyone who does not want to carry a firearm, but may require a harmless tool to scare away undesirable individuals.

The professional joker will surely welcome this flashlight to surprise and scare his friends and no end of fun can be had with this really useful article.

It is made entirely in pressed steel, gun metal finish. It takes our No. 10420 standard battery and our No. 5008 standard bulb, parts that may be obtained from any dealer.

The size is 4x2¾x⅞ inches over all.

No. 7199 "Electro" Revolver Flashlight, complete, each.....$1.50

No. 5008 Renewal lamp, 2½ volts..... .25

No. 10420a Renewal battery, 2½ volts..... .25

Gentlemen: Springfield, Mo.

I have found all your goods AS YOU HAVE LISTED THEM. I have also tested each article and have had VERY SATISFACTORY RESULTS.

Yours truly, LESLIE G. CALL.

"ELECTRO" FLASHLIGHTS

1054

1055

3437

Our flashlights are all imported and are of the best possible grade of materials.

The battery which we use with these flashlights is a domestic one which has proved a success for years; it is impossible to find any better battery on the market. If not abused they will give from 8000-12,000 flashes, and if used only occasionally for a few minutes at a time, will last for months.

The No. 1055 lamp is supplied with the 1043 bulb and in addition has a large bull's eye lens inserted in top of case. This is by far the most brilliant flashlight sold anywhere at any price.

No.		Price.
1054	Flashlight complete, size 2⅞x3¾x1, with battery	$0.45
1055	Flashlight with bull's eye lens, finer finish, with battery	.50
1043	Extra Lamp Bulb for Flashlights	.10
1056	Extra Battery for No. 1054 and 1055 Flashlights	.20

Our No. 3437 flashlight represents the latest advancement and is made on an entirely new plan. It opens side-ways like a cigarette case and is made entirely in brass, nickel plated and highly polished all over. It takes our regular No. 1056 battery and is furnished with our Tungsten lamp. The lamp itself sets in a reflector as clearly shown in illustration.

Contrary to all other flashlights you do not have to press the button if you want to get light but there is a little switch at the side of the case which is moved up or down thus giving a steady light until the switch is opened. This flashlight is without doubt the best made article of this sort and you must see it to fully appreciate it. We guarantee full satisfaction. The size over-all is 3¾" x 2¾". It is 15-16" thick.

No. 3437 Nickel flashlight, with battery. Price..... $1.45
No. 4000 Extra lamp for above, 3½ volts. Price..... .25

Important Note. ALL our flashlight batteries are sealed with a guarantee label. By means of two short wires or pins test the battery by connecting the test wires to the lamp bulb. If the lamp burns brilliantly, the battery is O. K.; if not return battery to us and we will replace it free. **Once the guarantee label is destroyed, we will positively not replace battery.**

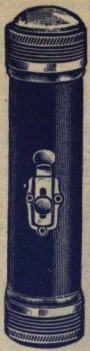
Dear Sirs: **No. Mehoopany, Pa.**

I received order all right. I AM WELL PLEASED, especially with the searchlight and receivers, WHICH ARE BETTER THAN I EXPECTED. Yours truly, ROGER WILLIAMS.

TUNGSTEN FLASHLIGHTS.

4710

3418



6780

While we are listing a selection of cheaper flashlights elsewhere in this catalogue, we feel that many persons desire an absolutely first class article, giving intense light, yet using little current. We therefore take great pride in offering herewith our tungsten flashlights, which are absolutely the best ones made, irrespective of price or claims of any other product. The workmanship of the cases is of the highest order. Each tungsten lamp is tested three times and is warranted to be perfect. The battery is the new epoch-making *tungsten battery* giving 300 per cent. to 400 per cent. more light and life than any one made so far. *This battery will light any of our tungsten flashlights 3 to 4 hours at a stretch.* This is absolutely unparalleled in the history of flashlights.

No. **4710** Size 1¾x3½x¾ in., 2½ volts, with lens, complete, each..... **$0.55**

No. **1535** Renewal lamp, 2½ volts, ... **.20**

No. **821** Renewal battery, 2½ volts, 2 cells, 2½x1⅝x13/16 in., each..... **.20**

SMALLEST FLASHLIGHT MADE.

No. **3418** *Smallest and lightest flashlight made.* Fits your vest pocket, nickel case, highly polished, 2½x1¼x11/16 in., 2½ volts, complete ..... **.85**

No. **5008** Renewal lamp, 2½ volts, opal back..... **.25**

No. **10420** Renewal battery, 2½ volts, 2 cells, 1⅞x1⅛x9/16, each..... **.25**

TUNGSTEN TUBULAR FLASHLIGHT.

This flashlight is the smallest tubular light made. Fibre case, permanent contact, nickel finish throughout.

No. **6780** Tubular flashlight, 1¼x5 in., 2½ volts, complete, each..... **$1.00**

No. **5018** Renewal lamp, 2½ volts, ... **.20**

No. **929** Renewal battery, 2½ volts, 2 cells, 1x3¾ in., each..... **.20**

Gentlemen: East Stroudsburg, Pa.

The electric flashlight sent me a few days ago has been received AND IS ALL RIGHT. I AM SO WELL PLEASED WITH IT, THAT I WOULD LIKE TO HAVE ANOTHER, for which find enclosed 55c in stamps.

Yours truly, H. B. BRISK.

"ELEKTRA" TUBULAR SEARCH LIGHT.

1057

This is a light of which we feel justly proud, and for the price at which we offer it, is the best search light either imported or domestic that can be manufactured. We have taken the sole agency for the U. S. for the manufacturer's complete line; this enables us to sell these lights at a price no domestic manufacturer can approach.

This search light should not be judged by its low price, as the very best material and highest grade labor is used in its manufacture. The case will last for years with ordinary care, and the battery will give over 20,000 flashes before exhaustion. These lights are guaranteed to be equal to any domestic light selling for higher price; in fact, it will produce a much brighter and stronger light than the $1.50 article now on the market.

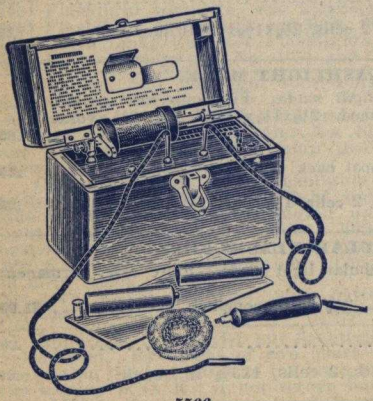
These search lights are made in metal, all parts highly nickel plated and polished. The covering is imitation leather.

The reflector is silver plated.

By turning the contact spring steady light is obtained.

No.		Price
1057	Search Light, complete 1½ x 9 ins., with carbon lamp	$0.75
2057	The same search light but fitted with No. 4000 Tungsten lamp (25 per cent. more light)	0.85
1043	Extra Lamp Bulb, for search lights	0.10
1058	Extra Batteries for search lights (3 cells)	0.25

THE "ELK-ELECTRO" MEDICAL BATTERY



5566

Our aim in bringing out the ELK BATTERY has been to reach a class of people who cannot afford to be treated by a physician. We realize the need of a battery in every home for general applications of faradic electricity, for it is beneficial to everyone, man, woman or child.

It is becoming more necessary each year that everybody should be familiar with electrical current, and more so with faradic electric current, as this is one of the greatest medical currents known.

In bygone days people overlooked the importance of following the advance of science, but now it is generally known that faradic electricity will conquer many complaints.

It puts life and force into whatever it touches and its equals are few in cases of Rheumatism, Paralysis, Locomotor Ataxia, Loss of Vitality, Lack of Nerve and Vigor, poor circulation of blood.

Brockton, N. Y.

Gentlemen:

I received the tungsten lamps that I ordered from you yesterday IN GOOD CONDITION. I AM WELL SATISFIED WITH THEM. Thanking you for past favors, I am, Yours truly, RALPH LILLEY.

THE "ELK-ELECTRO" MEDICAL BATTERY—Continued.

The "Elk-Electro" Battery is without question the neatest and most durable and complete battery manufactured for home use. All parts that would tend to make it complicated have been dispensed with, and as it stands it is the simplest battery and easiest to operate.

All parts are interchangeable, and the metal parts highly nickel-plated. The coil is wound on a one piece spool. The Vibrator is screwed to the head, it is not stamped out, but mechanically put together. The point of contact is of the only real electrical contact metal, **being platinum,** in fact it is of all high class material.

This battery is made up in a case 8 in. long, 4 in. wide, 6 in. high, neat, only weighs 4 pounds net.

ATTACHMENTS.

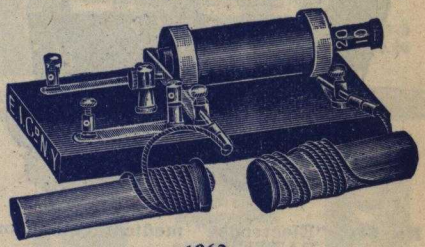
Furnished without charge—1 sponge covered disc, 1 wood handle to fit same, 2 metal hand electrodes, 2 conducting cords with tips, 1 aluminum foot-plate, and the book of directions for treating disease with Faradic currents of electricity, by J. J. Mackey, M.D.

We furnish a good dry cell with the outfit. Our No. 1001 or No. 990 battery or any 2½ x 6 inch dry cell can be used when the original dry cell is exhausted.

No. 5566 "Elk-Electro" Medical Battery, complete.....**$2.90**

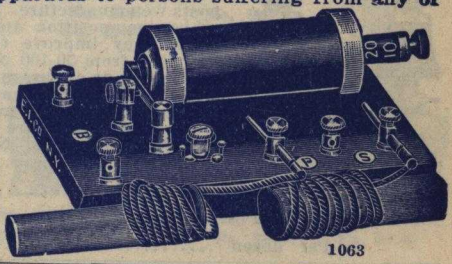
"ELECTRO" MEDICAL COILS

These coils, which come into use more and more every day, are especially adapted for the treatment of rheumatism, neuralgia, nervous complaints, etc. Persons who suffer from rheumatism in any particular part of the body will generally find much relief from the use of electricity in this form. If a hand or foot is affected place same in hot water, to which two or three tablespoonfuls of ordinary salt is added. One of the handles of the instrument should be immersed in the water while the other should be held firmly in the unaffected hand. A treatment of from 10 to 15 minutes per day will bring relief in the most obstinate cases. We will be glad to give special instructions as to the use of this class of apparatus to persons suffering from any of the above ailments.



1062

No.		Price
1062	Household Medical Coil, 2½x3¼ inches.....	**$0 70**
1063	Larger size Medical Coil, primary and secondary connections, 3½ x4½ inches.....	**1 10**
	In 6 lots, each...	**1 02**

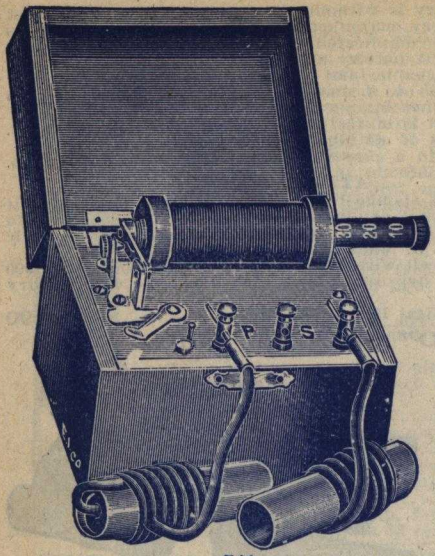


1063

I have received the articles ordered. Thanking you for your KIND INFORMATION AND YOUR PROMPT ATTENTION TO MY ORDER, I remain,

Yours truly,

F. H. MICKEL.



541

The "Electrodoc" Coil

This is the best coil we manufacture and a marvel of construction. This coil is finished in hard quartered oak, finely finished throughout. Hinge cover, nickel handles, switch, 3 posts for different treatments, strength regulator, etc.

The bottom slides back and takes our No. 1056a flash battery. The "Electrodoc" is the smallest and **most powerful** medical coil in existence and guaranteed in every respect.

Size of box, 3¾ x 3 x 3 inches;

No. 541 "Electrodoc" medical coil, complete, WITH BATTERY **$1.50**

No. 1056 Renewal Battery ..... **.15**

1919

1920

Hard Rubber Binding Posts

These binding posts are the most popular posts we manufacture. Being made of molded hard rubber composition and having a high polished finish, they improve the appearance of any instrument from 50-100 per cent. They are used on nearly all our apparatus. Especially recommended for **Wireless Instruments**, as they prevent grounding or shorting, when the hands unconsciously touch them. They are made only for 8/32 screw. No. 1919 has 5 parts. No. 1920 has 4 parts.

No. 1919 Binding Post, each $0.05

Per dozen ..... .50

No. 1920 Binding Post, each ..... .05

Per dozen ..... .50

Tiffin, Ohio.

Dear Sirs:

I have been telling our Physic's teacher how much cheaper you sell your goods, and that my motor and lights PROVED SATISFACTORY.

Yours truly,

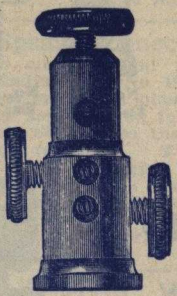
JOHN NELIGH.

Binding Posts.

These binding posts can be furnished either nickel plated or in lacquered brass. They are all made of first quality brass, with holes accurately bored, well fitting set screws, and are highly polished. **WE CARRY THE LARGEST ASSORTMENT OF BINDING POSTS IN THE UNITED STATES.**

CUTS ARE ALL FULL SIZE

No. B-7
Ea. $0.08



No. B-1
Ea. $0.11

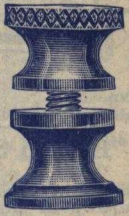
No. B-2
Ea. $0.09

No. B-5
Ea. $0.05

No. B-26
Ea. $0.05

No. B-27
Ea. $0.05

No. B-8
Ea. $0.05



No. B-25
Ea. $0.08

No. B-31
Ea. $0.07

No. B-10
Ea. $0.04

No. B-29
Ea. $0.03

No. B-6
Ea. $0.03

No. B-30
Ea. $0.02

No. B-28
Ea. $0.04

No. B-24
Ea. $0.03

Dear Sirs: Camden, N. J.

This is my fourth order and I want to thank you for THE ATTENTION my orders have received. Everything I received was VERY SATISFACTORY.

Yours respectfully, H. SCHROEDER, JR.

No. B-9
Ea. $0.05

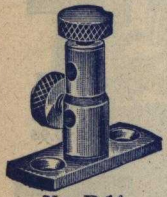
No. B-11
Ea. $0.05

No. B-3
Ea. $0.04

No. B-4
Ea. $0.03

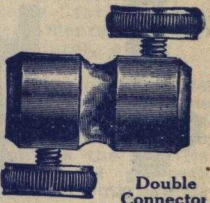
No. B-12
Ea. $0.03

No. B-13
Ea. $0.07



No. B-14
Ea. $0.11

No. 162
Ea. $0.02½



B-22

Double Connector
$0.05 Ea.

Cord Tips.

No. 6223
Separable, Price $0.05

No. 6225
One Piece, $0.02

"Electro Spring Binding Posts"

The most sensible binding post ever invented. No screws or nuts to lose. Simply press down thumb piece and wire is released. Takes any size wire up to No. 10. Connections are made from 8 to 10 times quicker than with old style posts. Wire is gripped firmly; jarring, vibration and pulling have no effect on connection. No more loose contacts or losses of current. Made in one piece of the highest grade copper-bronze-spring metal, manufactured expressly for us.

The "Electro Spring Binding Post" has been adopted by the best known battery concerns, telegraph, telephone companies and railroads.

No. 1908 Size 1"x⅜", as per cut, each....4c
In 12 lots..3c In 50 lots..2½c

1908

Seattle, Wash.

Gentlemen:

I received the 30 spring binding posts yesterday and all the others a week ago. I found everything ENTIRELY SATISFACTORY.

Yours truly,

J. S. HATA.

"ELECTRO" SPRING BINDING POSTS (Continued).

Special Bronze Metal

Our No. 1915 has been brought out on account of a large demand for a smaller size spring binding post than our No. 1918. Cut shows post full size. It is especially recommended where room is limited. A beautiful post, well finished.

No. 1915 Spring Binding Post, each...$0.03

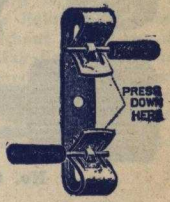
In 12 lots, 2½c.; in 50 lots, 2c

No. 1915 Full Size.

Double Spring Connector.

This is a twin model of our now famous "Electro" Spring Binding Post No. 1908. Is used especially in wireless to connect phone cord tips, etc. Many hundred uses will be found for our new connector. Can be bent so that both connectors stand up vertically. Two connectors may be crossed at right angles and screwed down for a quadruple connector, etc. Invaluable where many connections are to be made and handled rapidly.

No. 1909 Double Spring Connector, each.....$0.06



No. 1909

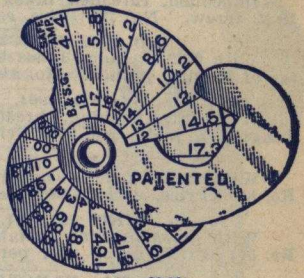
"Electro" Wire Gauge.

FINELY FINISHED. POLISHED WHITE METAL. GRADUATED WITH EXTREME ACCURACY.

Cut shows our IMPROVED "ELECTRO" POCKET WIRE GAUGE, for measuring wire from No. 18 to No. 000 B. & S. gauge. On the front is also given the carrying capacity of copper wire in amperes, and on the reverse side the approx. decimal equavalent of the various size wires.

Electricians, linemen, and all having occasion to use wire for electrical purposes will find this gauge invaluable.

No. 6240 "Electro" Wire Gauge....$0.55



6240

Fusible Cut Outs.

These cut outs are generally put in series with instruments which it is desired to protect from lightning or other heavy currents. The fuse, which is a thin lead strip is connected to two connection pieces and the whole is clamped between the two springs of the fuse block. A current of over two amperes is sufficient to melt the thin strip and consequently interrupt current. *It is an absolute necessity in wireless work to safeguard the delicate instruments from destruction by atmospherical discharges through the aerial wire.*

918

No. 918. Fusible cut out, with fuse.....15c
No. 919. Extra fuse, copper terminal 3c

Lindsborg, Kan.

Dear Sirs:

I am a regular customer of the E. I. Co. I have ordered about ten dollars' worth of goods AND ALL HAVE BEEN OF VERY GOOD QUALITY. I would like to know about the Wireless Course.

Yours truly,

HEATH LABORATORY.

"Electrose" Parts.

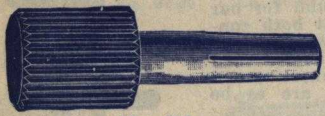
No. 720

No. 945

No. 6964

No. 809

No. 507


No. 911

No. 508

No. 908

ALL CUTS FULL SIZE.

NO. 720. ELECTROSE SWITCH HANDLE.
Imbedded, threaded brass bushing. Length, ⅞ inch. Bushing for 10-32 screw. No. 720 Price, each, .04; per dozen ..... .40

NO. 945. ELECTROSE SWITCH HANDLE.
With 6-32 threaded brass bushing. Length over all, ⅞ inch. Diameter of handle, ⅜ inch. No. 945 Price, each, .04; per dozen ..... .44

NO. 6964. ELECTROSE KNOB.
With brass bushing, threaded to take 8-32 screw. Diameter, ¾ inch. Length, ¾ inch. No. 6964 Price, each, .06; per dozen..... .60

NO. 809. ELECTROSE KNOB.
With threaded brass bushing to take 8-32 screw.
No. 809 Price, each, .04; per dozen..... .40

NO. 507. ELECTROSE KEY KNOB.
With brass bushing to take 8-32 screw.
No. 507 Price, each, .03; per dozen..... .30

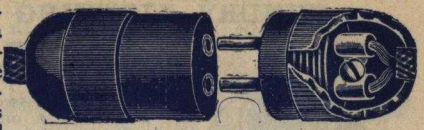
NO. 911. ELECTROSE SWITCHBOARD PEG.
Standard size. With tapered, slotted shank, imbedded in head. Length of head, 5/8 inch. Diameter of head, ½ inch. Length of shank, 15-16 inch. Length over all, 1½ inches.
No. 911 Switchboard Peg, each, .10; per dozen..... .90

NO. 908. ELECTROSE TELEGRAPH KNOB.
Has 8-32 screw, moulded in knob, extends ⅛ inch.
No. 908 Price, each, .06; per dozen..... .60

NO. 508. KEY HANDLE.
With threaded brass imbedded bushing, 6-32 or 8-32.
No. 508 Price each, .03; per dozen.....$0.30

Dear Sirs: Oklahoma City, Okla.
I have done some trading with the E. I. Co. and I FIND THEIR NAME IS OF AN HONEST, TRUSTWORTHY NATURE.
Yours truly, L. LUTHRIE.

THE "ELECTRO LILLIPUT" CONNECTOR.

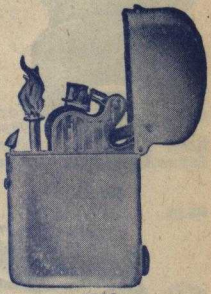


6825—Cut full size.

The "Electro Lilliput" connector, as its name implies, is a small connector suitable for battery current work. It is made of four pieces, two sections containing the metal plugs and holes for the separable contacts, and the two other parts consisting of neat covers with holes through which the connecting cord is passed and connected to the small binding posts. These connectors are largely used on automobiles where battery or magneto current is used for lighting the lamps. These connectors facilitate the removal of the lamps without disturbing the wiring other than disconnecting the special connector. May be used for any work where wires are to be often connected and disconnected. Wireless amateurs, wishing to lengthen their receiver cords, will find that this little connector may be readily used with the insertion of the necessary length of extra cord.

No. **6825** The "Electro Lilliput" Connector, complete, as described..... **$0.15**

THE "ELECTRO" LIGHTER.



9900

It was American inventive genius that solved the lighter problem. The "Electro" is the one practical pocket lighter. The great need for it—the enormous field—is shown by the wide sale in this country of the clumsy foreign lighters that thousands of men have bought and carry, despite their shortcomings.

The "Electro" is the one thin-model Lighter.

It takes up less room in the pocket that a match safe.

It is as neat as a piece of jewelry.

Both case and works are strictly watch construction.

The mechanism is extremely simple and strong, never gets out of order.

The Electro gives a true spark and a clear flame at the touch of the spring.

It appeals to every man who ever has need of a match.

The Electro Lighter strikes a light instantly by an intensely hot spark igniting the vapor of benzine. This spark is the genius of the Electro Lighter. It is produced by the friction of a toothed wheel on a slip of "Ceric Iron"—a new metal discovered by Dr. Auer von Welsbach, inventor of the Welsbach mantle.

Ceric iron is the only metal ever discovered which will yield this intensely hot spark, which is the reason why no pocket lighter up to the present time has been really practical and successful.

Electro Ceric Sparkers are carefully selected pieces of this ceric iron and are put up in small metallic tubes to protect them from the atmosphere. Each piece lasts for 5,000 lights.

No. **9900** "Electro" Lighter **$0.60**

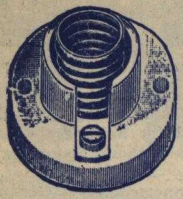
No. **9901** Extra ceric iron pieces ..... **.10**

Brandon, Man., Can.

Dear Sirs:
I received goods, and THEY ARE IN GOOD CONDITION.
Yours truly,

J. K. DICKSON.
Prides Crossing, Mass.

SUNDRY LIGHTING MATERIAL.

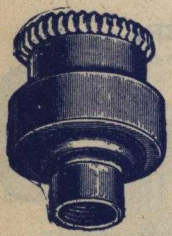


1052

Receptacles.

We carry two sizes of receptacles for miniature lamps, one for screw base lamps and one for candelabra base lamps. The miniature receptacle is to be used for lamps Nos. 1042 to 1046 and the candelabra receptacle for Nos. 1047 to 1051. Both are made in porcelain with brass trimmings and can be screwed to wall, table, etc., for permanent use if desired. Our No. 1271 Reflectors can be used with both styles.

No.		Price
1052	Miniature Receptacle	$0 05
	In twelve lots, each	04
1053	Candelabra Receptacle	06
	In twelve lots, each	05

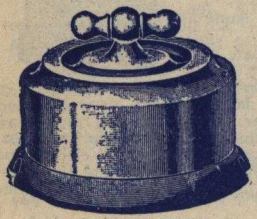


3721

Brass Sockets,

are made in two styles, for candelabra and for miniature base. The base of each fits our No. 1276 wall bracket, or any tube having ⅜ inch pipe (⅛ inch pipe measure). They are extremely convenient to hang downward, as for instance over dining table, or writing desk. Our Reflectors are made to fit both styles.

No.		Price
3721	Socket Miniature or Candelabra	$0.10



516

MINIATURE SNAP SWITCH.

This is as pretty and useful an article as you ever saw. It is the smallest snap switch made and an exact duplicate of the expensive ones used on regular lighting systems. Our miniature snap switch is used on small lighting plants and everywhere where a quick double break is required (in wireless, etc.). Carries 5 amperes.

Cover is beautifully nickel-plated, base is best porcelain.

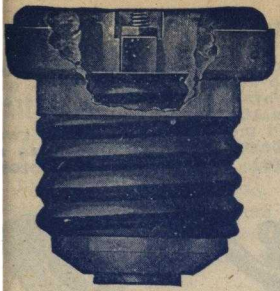
No. 516 Miniature Snap Switch, each.....$0.14

Dear Sirs: Minneapolis, Minn.

Please find enclosed an order for a candelabra base reflector; porcelain socket, and a candelabra base, brass socket. I received your one-inch coil IN GOOD ORDER.

Very truly yours, LOUIS POTTER

Adapters.



10004

10005

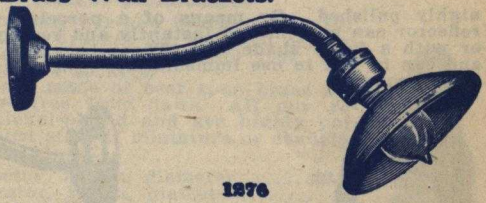
This new adapter fits the standard (large size) Edison sockets or receptacles. It has in its inside a candelabra socket. (see cut.) With its use a candelabra lamp can be used in a large Edison socket or receptacle.

Indeed by using No. 10005 adapter, a miniature lamp can be screwed in No. 10004 adapter.

No. 10005 adapter when screwed on any miniature base lamp becomes a candelabra base lamp. A very handy thing to have.

No.		Each
10004	Edison-Candelabra Adapter,....	**$0 12**
10005	Miniature-Candelabra Adapter.	**0 04**

Brass Wall Brackets.



1276

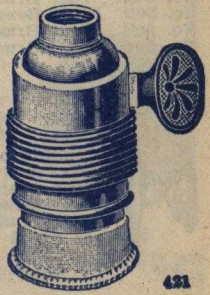
This is a distinct novelty of our own manufacture. It is to be used in halls, over desks, but especially near the bed as a reading lamp. The reflector behind the lamp doubles its light. Especially handy in connection with our No. 1274 pull socket. Can also be used as a table lamp by standing it up vertically. A flexible lamp cord should then be used for connections. A very pretty effect.

As our No. 3721 sockets, also our No. 508-513 reflectors can be used in connection with the bracket, we give below prices only for the bracket and wall plate alone.

Standard length of bracket, six inches.

No. 1276 Brass Bracket and Wall-plate, complete.....$0.90

SMALL BRASS SOCKETS WITH KEY.



421

This decided novelty on the American market will be welcomed by all our friends. The uses of this article are apparent. It does away with an extra switch to turn the light off or on. Made in brass and porcelain entirely. As pretty and useful an article we came across in a long while. Base fits any tube ⅜ inch pipe (⅛ inch pipe measure). Our reflectors fit both styles.

No. 419 Miniature socket, with key..... $0.28

No. 421 Candelabra socket, with key..... .32

Gentlemen: Stockton-on-Tees, England.

Please send me your catalogue of which I have heard so much. A friend of mine has an ampere meter which he bought at your establishment TWO YEARS AGO AND IT CONTINUES TO GIVE SATISFACTION.

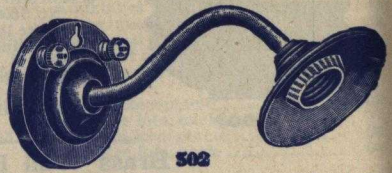
Yours truly, C. C. FUNNELL.

Wall Brackets

Since introducing our No. 1276 bracket in 1906, we have had so much demand for complete ready-to-attach brackets that we went extensively in the manufacture of brackets and present herewith the finest line of wall brackets in the country.

These brackets have all our patented metal base, carrying two nickel posts well insulated from the base. Each bracket has a socket (either candelabra or miniature) and a fine reflector,

501



502

highly polished. By means of a porcelain screw brushing the reflector can be removed instantly and replaced with another one, or with a fancy shade, etc. These brackets are READY WIRED and can be put to use immediately. The metal arms are of brass well lacquered.

503

504

NOTE.—These brackets may be ordered without reflector. Deduct 5c. from list price when doing so.

NOTE.—Our No. 1277 reflectors do not fit any of these brackets, they only fit No. 1052, 1053, and 3721 receptacles and sockets.

No. 501	Wall Bracket, miniature socket, total length 4 in.	$0.35
No. 502	Wall Bracket, candelabra socket, total length 6¼ in.	.45
No. 503	Wall Bracket, miniature socket, total length 3½ in.	.35
No. 504	Wall Bracket, candelabra socket, total length 5½ in.	.45

FLUSH WALL OR CEILING BRACKET.

505

This bracket is used where the light is wanted quite near the wall, or to hang from a low ceiling. Used extensively in places where one is cramped for room. Has patent metal base, binding posts and reflector. Comes only for candelabra base. Miniature base lamps are fitted in it by using our No. 10005 adapter.

No. 505 Flush Wall or Ceiling Bracket..... $0.30

London, Ont., Can.

Dear Sirs:

I am QUITE SATISFIED with the book I received from you some time ago, also the PROMPT WAY in which YOU FILLED MY ORDER.

Yours truly,

C. HEENEY.

Electric Candlesticks.

This pretty article will be welcomed by many who like good but not too expensive table light, such as is often eeded on the experimental table, to read in bed, etc.

Our candlesticks are handsomely finished in brass, well lished. There are two binding posts for connections. LL WIRED, ready to use. Two styles, one for can- labra and one for miniature base lamps.

o. 506 Candlestick as described, candelabra socket **$0.30**

o. 507 Candlestick as described, miniature socket. **.30**

507

Nickel Reflectors.

These reflectors fit only our new brackets Nos. 501, 02, 503, 504, and ceiling bracket No. 505, and candle- ticks 506, 507. They do not fit our No. 1052, 1053 eceptacles, No. 3721, 1274 sockets.

These reflectors are made of best spun brass and re guaranteed to be free from flaws. All our re- ectors are triple nickel-plated and are highly pol- shed. Your order must state if miniature or candela- ra, as there are two kinds.

o. 508	Nickel reflector,	1½	in. diameter.....	$0.05
o. 509	Nickel reflector,	2	in. diameter.....	.07
o. 510	Nickel reflector,	2½	in. diameter.....	.09
o. 511	Nickel reflector,	3	in. diameter.....	.10
o. 512	Nickel reflector,	4	in. diameter.....	.12
o. 513	Nickel reflector,	5	in. diameter.....	.15

508-13

Fancy Bead Shades.

515

These shades, like our re- flectors, fit only our new style brackets. Will not fit our 1052, 1053 receptacles, nor 3721 and 1274 sockets.

These shades give extremely pretty effects and are to be used with either our No. 501 or 502 brackets.

They have a fine metal body, machine-cut, and beautiful glass beads. No. 514 has beads in different colors. No. 515 comes in green only.

514

o. 514 Fancy Color Bead Shade, each..... **$0.40**

o. 515 Green Bead Shade, each..... **.30**

Your order must state if for candelabra or for miniature sockets.

entlemen: Fargo, N. D.

I received my order to-day, and EVERYTHING WAS O. K. I xpect to send another order soon.

Yours respectfully, **FLOYD EMERY.**

Electric Miniature Lamps.

1043

Battery Lamps for Flashlights.

The following lamps are imported and are guaranteed to be the best foreign product. They are the most reliable miniature battery lamps which have thus far been produced. They are very easy on battery, as none of them consumes more than ¼ ampere, and if they are used with the proper voltage a brilliant, white light is always insured. Some manufacturers make small lamps which they claim give a brilliant light, which is obtained at the expense of the lamp itself, as same are actually intended for 3½ volts, while the manufacturers mark them 4½ volts, and of course if a 4½ volt current is applied, the filament of the lamp quickly burns out.

Our lamps, however, are full 4½ volt filaments and are constructed with a view of extending the life of the lamp as long as possible and at the same time give a maximum light. These lamps are all furnsihed with miniature screw bases.

1043. Two candle power, 4½ volts, ... **$0.10**
In 12 lots .....9c. In 25 lots .....8c.

1043A. Two candle power, 4½ volts, larger size, ... **0.14**
In 12 lots .....13c. In 25 lots .....12c.

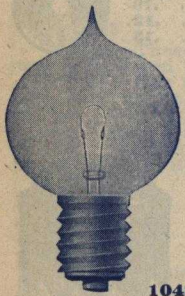
A distinctive feature of the 1043 lamp is that there is a small lens blown in the top of the bulb, for use in small flashlights, etc., which increases the brilliancy of the light over one-third.

Battery Lamps, Larger Size, Miniature Base.

1044

1044	Candle Power	3,	volts 7,	Amperes	.25
1045	"	" 4,	" 8½,	"	.20
1046	"	" 6,	" 10	"	.20

Price, each **$0.20**
In six lots, each ..... **.19**
In twelve lots ..... **.18**


1048

Candelabra Lamps.

These lamps are especially adapted to burn with *storage batteries* but can of course, be used with dry batteries or any other style of cell, which gives a strong, steady current. They range from one to sixteen candle power and are made in round shape bulbs. They are all to be used with candelabra sockets. In ordering lamps, always state voltage; we will furnish the highest candle power possible.

No. 1048	Volts 3 to 6,	Candle	Power 2
" **1049**	" 4 to 6,	"	" 4
" **1050**	" 6 to 7,	"	" 6
" **1051**	" 8 to 12,	"	" 10

No. 1048-51 Candelabra Lamps **$0.20**

NOTE. As lamps are handled very rough in the mails and express we can positively NOT make good on broken lamps in transit. All lamps are packed in wadding and greatest care is exercised in shipping them.

Johnstown, N. Y.

Dear Sirs:
The two lamps that I ordered the other day have just been received and THEY ARE O. K.

Yours truly,
EARL HODDER.

Pea Lamps and Scarf Pins.

1272

PEA LAMP.

This is the smallest lamp made (cut full size) it operates on two dry cells; candle power 1; ampere 0.25. Furnished with plug and cord, the same as the scarf pins.
No. 1272 Price each 25c

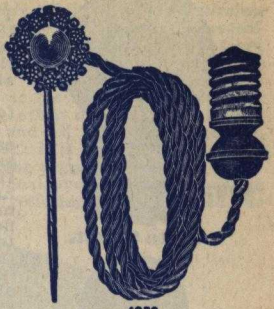
SCARF PINS—ASSORTED,

Such as Horseshoe, Flowers, Crescent, Heart Shape, Etc.

Cable can be concealed under tie. Plug fits any of our flashlights by simply removing the bulb.

Put flashlight in pocket and flash pin by pressing button.

No. 1350 Scarf Pin, with two foot cord and plug.....45c
No. 1350a Scarf Pin, with our No. 1054 flashlight case and battery, complete outfit.....70c



1350

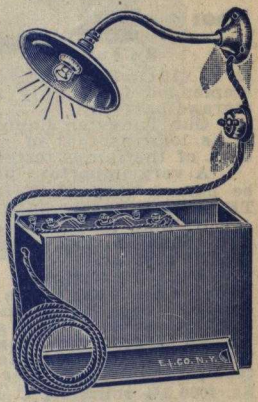
"Electro" Lighting Outfit.

Here is something you always wanted. A handier thing can hardly be imagined. This little lighting outfit can be put to hard use and will stand up remarkably. Used one hour each day it will last from 3-4 months. Battery renewal costs but 69 cents. **Will give continuous light for 80 hours before exhausted.** Used as bed reading lamp, in dark closets, halls, on stairs, cellars, in the dark room, in toilets, etc. Every house needs one or more out-

rs. **The powerful Tungsten lamp gives 5 candle** ower,—a strong light. OUTFIT IS READY IRED, attach the bracket to wall and turn the witch. Outfit comprises: 3 No. 990 Columbia dry lls, No. 1276 6-inch brass polished bracket, No. 21 brass socket, No. 510, 2½-inch nickel reflector, o. 516 nickel snap switch, No. 4000a Tungsten lamp, yards best, green lamp cord, 2 battery connectors, ndy battery box, 5 brass screws.

o. 1700 "Electro" Lighting Outfit as described, complete $2.00

o. 4000a Special Tungsten renewal lamp, each, $0.25

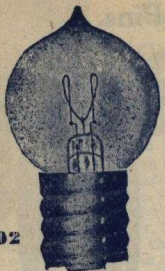


1700

entlemen: New Castle, N. B.

I purchased one of your No. 1043 Lamps from a friend ABOUT IGHT MONTHS AGO AND HAVE USED IT VERY CONSTANTLY. T WAS VERY SATISFACTORY and this is partly the reason WHY I M NOW ORDERING four lights instead of one; AS I FEEL CONIDENT THAT THEY WILL BE ENTIRELY SATISFACTORY. Also I ill be glad TO RECOMMEND YOUR GOODS FOR QUALITY AS VELL AS PRICE. Yours Respectfully, R. D. W. FLEWELLING.

Tungsten Lamps.



4002

5½ to 8 Volt.

4001

3½ Volt.

It is hardly necessary to praise the new Tungsten Lamp. During the past months the newspapers and magazines have written so much about the Tungsten Lamp that we find it unnecessary to write an elaborate article about it.

The uninitiated will gather enough information from the following:

The Tungsten is the only existing incandescent lamp whose light is closer to sunlight than any other lamp in existence. It is in a class by itself. You perhaps had occasion during the last months to admire the large Tungsten Lamps which flooded the main show windows in your town, the beautiful light of which attracted everybody. The light is absolutely unsurpassed in its dazzling white and is the best for the eyes. Its light surpasses even that of the Multiplex and Tantalum lamps, which for several years past were leaders.

But the Tungsten has another large advantage. It is positively more economical than any other lamp in existence, even the Tantalum lamp not excepted. The Tungsten gives 1 C. P. for each watt. In other words, an 8-volt lamp, taking 1¼ amperes, will give 10 C. P. (8x1¼=10 watts). A 10-volt lamp, taking 1 ampere, gives 10 C. P. (10x1=10 watts), etc., etc. For this reason it cannot be recommended too highly in connection with dry cells, Edison and storage batteries.

Our Tungsten Lamp can be hung in any position and its life is as long as that of any of our carbon lamps. In fact, 20 per cent. of the lamps tested lasted from 400 to 600 hours.

A very important point about our Tungstens is that they can be burned at a CONSIDERABLY HIGHER VOLTAGE ALTHOUGH THIS DECREASES THE LIFE OF THE LAMP. In other words, a 4-volt lamp may be used on 6 volts without danger of burning out. When burned at a higher voltage the efficiency of the lamp is still greater.

With the Tungsten Lamp it is possible, at last, to light up a room or even the house with electricity at an astonishingly small cost. In fact, the cost of electric light by using the new lamp comes close to that of gas.

At present the Tungsten lamp is manufactured in the following voltages and candle power. WE HAVE NO OTHERS, therefore please do not order or ask for styles not listed below:

No. 4000 1¼ volt= 1¼ C. P., 2½ volt=2½ C. P., 3½ volt=3½ C. P. Price, each..... $0.25

No. 4001 6 volts (same C. P. as corresponding voltage), Price, each .35

No. 4002 8, 10, 12, 14, 16 volts (same C. P. as corresponding voltage), Price, each ..... .60

All lamps are packed with the utmost care, and are sold at the sole risk of the buyer. We cannot make good on damaged ones, nor can we take back or exchange lamps.

Hyde Park, Mass.

I was VERY MUCH PLEASED with the last lamps I bought of you.

Yours respectfully,

ARTHUR W. ALDEN.

THE "ELECTRO RHEOSTAT-REGULATOR."

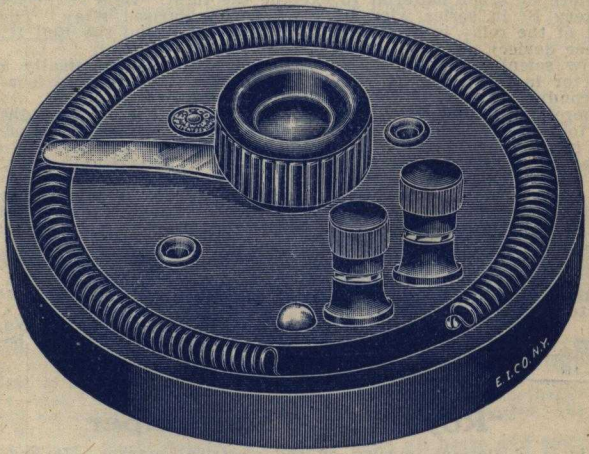
PATENTED FEB. 1, 1910.

This little current regulator makes a valuable addition to any wireless set where it is used to regulate the battery current. It is especially recommended in connection with the *audion* detector, in fact, here it is indispensable.

With battery lamps it is very valuable, where it is used to prevent the lamps from burning out on account of too strong a current, etc.

In connection with small motors it will regulate the speed more accurately and more gradually than could be done by any other means. This feature makes it very desirable for Dentists, Doctors, and all those who need an effective regulator. In connection with cautery work it is indispensable, as any degree of heat can be obtained,—due to the very fine regulation.

Advantages over other small rheostats: Gradual and accurate regulation of current; great current capacity; little heating, resistance coil air-cooled; no concealed parts; impossible to get out of order.



5000

For electro-plating work it will be found indispensable. A gradual increase of current, as is well known, is necessary especially for fine work.

The wire used in this regulator is the finest imported high resistance wire. It will positively not rust, break nor bend, even under a constant load of 2 amperes. This we guarantee in every instance. The groove which holds the spiral is ( ) shaped (PATENTED), which makes it impossible for the coil to fall out or become dislocated once wound in place.

Resistance is 10 ohms.

Maximum capacity, 2 amperes continually; size, 4 inches diameter; thickness of base, 9/16 inch; weight complete, 3 ounces.

No. 5000 Rheostat-Regulator (patented), in neat cardboard box, price.. **$0.60**

Rochester, N. Y.

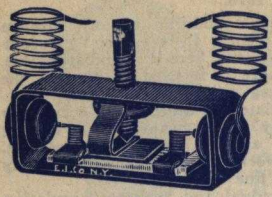
Gentlemen:

Two years ago I bought one of your Rheostats and although it has undergone much hard usage, IT IS AS GOOD AS NEW TODAY.

Yours truly,

W. COLEMAN.

Selenium Cells



517

Everybody has read about the recent experiments of telephotography (sending photographs over a wire hundreds of miles) made by Professor Korn and others.

It is also known that if the problem of tele-vision is ever solved, the selenium cell will play an important role.

At present we are the only concern in the United States importing these cells. They are the most sensitive ones made and are identically the same as the ones used by Professor Korn and other authorities.

The cells operate as follows: The selenium cell S is covered with a box, cloth or other material to exclude the light. It is connected with a battery B′ in series with R, a sensitive polarized relay. The local circuit of the relay is connected with battery B″ and the Bell H (lamp or other device).

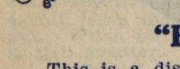
Now selenium has the peculiar property to be practically a non-conductor in the dark. In full light, however, the selenium is a fairly good conductor.

Therefore if now the light of a match, or other strong light M is made to fall on the small opening of our cell, the resistance of same, which in the dark is about 50,000 Ohms, falls to about 8000-10,000 Ohms, and the relay R will close the contacts, and bell H will ring. The action can be repeated indefinitely.

If anyone wishes to arise with the sun, place the selenium cell on the window sill, where the first rays of the rising sun will strike it. This operates the cell through he relay and the bell rings. This is a certain and positive alarm.

The number of batteries for B′ varies and is best found by experiment. Usually from 5-8 are required.

Our cell is the smallest in existence, size only 1 x 1¾ inches, all ready to connect.



Only our polarized relays such as our No. 1302, or better our No. 1303 or 1304, should be used with these cells.

No. 517 Selenium cell, each.....$5.00

"Royal" Pole Test Paper

This is a distinct novelty on the electrical market. It has never been sold before in this country. It very often happens that one does not know which of two wires is the positive or negative, and it is quite impossible to find which is which without complicated means. The "Royal" pole test paper does away with all trouble of this kind and is simplicity itself. It comes in small books containing about 25 leaves. Take one of these leaves, soak it a moment in water, place the two bare ends of the wires (with current on) upon the paper so that the ends are about ½ inch apart. One wire will print a red spot; this is the negative pole and the other the positive. Pole test paper can be dried and put away to be used over again and will last indefinitely.

Can be used from 2 volts up to 250 volts.

No. 1067 "Royal" Pole Test Paper, per book, price.....$0.25
By mail, extra ..... .02

Dear Sirs: **So. Omaha, Neb.**

Received the goods I ordered a few days ago, AND AM FULLY SATISFIED. I am glad to know you, AS YOUR LOW PRICES BEAT ALL OTHERS. Please send me your latest catalogue.

Yours truly, DR. SCHUEE.

OMNIGRAPHS

(Automatic Telegraph Machines)

This wonderful instrument has been produced to fill a gap that was lacking for long years. It is the only apparatus that will automatically teach you telegraphy without a teacher. The Omnigraph teaches you telegraphy, both Wireless, Continental and Morse at your own home at a ridiculously low cost. Our instrument will teach you positively better than any teacher could, and in less time. It takes actually the place of an expert and will send you messages at any speed you desire. You can send a single letter continuously or a short message and gradually make the message more difficult. First you learn all the letters, then you read a short message, then you can reverse the dial and the Omnigraph will send part words and part letters. We furnish dials containing numerals, punctuation marks and different messages at five cents each. Also dials for every letter.

The Omnigraph works perfectly on any line or with any instrument.

WIRELESS—If you have no one to teach you Wireless, the Omnigraph will do it with astonishing rapidity. By connecting either our No. 965 or our No. 950 buzzers with the Omnigraph, you will get a close imitation of a wireless message, and there is positively nothing like it made. **You can also connect your wireless 'phones across the electromagnets of the buzzer, putting a small condenser between 'phones and magnets** and you will hear then a message that **positively cannot be distinguished from a real wireless message.**

All our Omnigraphs operate sounders, recorders, relays, bells, buzzers, wireless sending apparatus, etc., etc. Our records are everlasting and cannot wear out.

Omnigraph No. 3777.

3777

This instrument, our cheapest style, operates by hand. Simply turn the crank and machine will send you messages at any speed from 5 to 30 words a minute. We furnish three dials with each instrument.

Measures 10½x5¼x3½ inches. Weight 2 lbs. with book, "How to Become an Expert Operator." **Guaranteed to work perfectly with any instrument or any line.** Extra dials 5 cents each.

We have twelve extra dials containing numerals, punctuations and different messages. Also a dial for each letter, 20 in number; they send single letter continuously.

Instrument finely finished mahogany base, all brass and metal parts gold lacquered.

No. 3777 Omnigraph as described **$1.95**

Omnigraph No. 1777

1777

This instrument is identical with No. 3777 but has in addition a fine key and sounder. The Omnigraph at will can be made to operate the sounder, and after a certain letter or message is memorized, you can learn to send by means of the key, till you can send as well as receive. An admirable instrument in all respects. Three dials furnished. For other dials see description under No. 3777.

Concord, N. H.

Gentlemen:

Order received O. K. GOODS ALL RIGHT, JUST WHAT I WANTED.

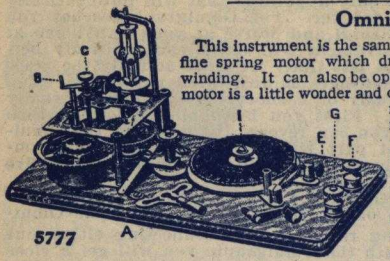
Yours truly,

L. W. DAVIS.

Measures 10½x5½x3½ inches, weight 4 lbs. Complete ready for use, key, sounder, **Transmitter**, battery, connecting wires and book, "How to Become an Expert Operator," with full instructions. Instrument is finely finished mahogany base, all metal parts gold lacquered.

No. 1777. Omnigraph, as described **$3.75**

Omnigraph No. 5777



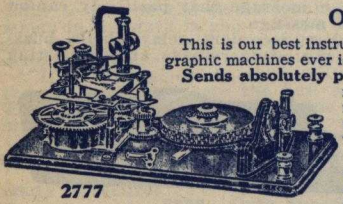
5777

This instrument is the same as our No. 3777 but with the addition of a fine spring motor which drives the Omnigraph for ¾ hour on one winding. It can also be operated by hand, by using the crank. The motor is a little wonder and can be regulated to work for any speed by means of governor. Equipment, dials and finish the same as No. 3777.

Measures 10½ x 5½ x 6 inches. Weight 3½ lbs. Complete, includes Transmitter arranged for hand or motor, Spring Motor with Governor for varying the speed, book, "How to Become an Expert Operator." Guaranteed to work perfectly with any instrument or on any line. Extra dials 5c each. Three dials furnished.

No. 5778. Omnigraph, with spring motor, as described, each **$4.80**

Omnigraph No. 2777


2777

This is our best instrument and it is one of the most ingenious telegraphic machines ever invented. A masterpiece in all respects.

Sends absolutely perfect at any speed from 10 to 100 words per minute. You can change the message in the fraction of a second even while the machine is running. You can send the same message continuously or a 5th part repeatedly.

This Omnigraph is provided with five movable message changers. Each dial is divided into five equal parts making the dials so far as changing the message is concerned **equal to 25 dials.** Starting the record when the dials are placed on the spindle from "A" to "E" having the dial marked "A" on top, it sends a comprehensive message of 50 words and before repeating the first dial it is equal to 100 words.

To change the message you move No. 1 message changer (the lever under the letters) in, so that it does not engage with the star wheel and move No 2 out, this will transpose ten words. By making this change with the five different message changers it will transpose 50 words. Now by putting 1 and 2 so that they engage with the star wheel, this will make 20 changes, and by making this change five times using different message changers each time, you make 100 changes. This same kind of manipulation can be done with three message changers, or four and with five, which will make the same proportion of changes in the message. Now remove the dials, shuffle them up, replace them on the spindle and you will begin all over again with new messages so far as practice is concerned. Just apply the rule of permutation to this Omnigraph and you will agree with us that you can send **thousands of new messages.**

If your memory is good we guarantee that you will master telegraphy, in one month, practicing each day. One set of 5 dials furnished.

No. 2777 Omnigraph as described, 11x6x5 inches. Weight 5 lbs. **$8.75**

Extra sets of records, **50c** per set of five dials.
We can furnish either Morse, Wireless (Continental) or Railroad.

Clayton, Ohio.

Dear Sirs:

May order has been received AND EVERYTHING AS REPRESENTED. I am WELL PLEASED and wish to thank you for YOUR ATTENTION TO SAME. I would also like to receive information concerning the TWENTY LESSON "COURSE IN WIRELESS" WHICH YOU ARE GIVING FREE.

Very truly yours,
MR. WILLIAM J. BAKER

1024

1030

1024a

Our new Pony receiver No. 1024 is without any doubt the best article for the money to-day. Without exaggeration it is the most carefully made and the most efficient of all.

Points of superiority: Hard rubber composition shell and cover beautifully polished. Powerful permanent steel magnet inside, soft iron bobbin core, fibre coil heads, very thin diaphragm, brass binding posts inside. Hanger can be unscrewed and receiver will then fit **without extra attachments,** our No. 8072 and 8073 headbands.

Look out for the metal case of inferior receivers, which is made of **cast iron and serves as a magnet.** Such receivers lose their magnetism shortly, besides you are liable to receive a shock from the metallic case. All this is impossible with our receiver; besides ours is very much lighter in weight. Unaffected by temperature changes.

This receiver has single pole; 2¼ x 1⅛ inches; weight 4 ounces; resistance 75 ohms. **If two of these receivers are used, it is possible to speak at a distance of 150 feet without the use of any batteries, one wire being sufficient if ground is used.** Our No. 1030 receiver will of course give even better results.

No. 1024 Pony receiver, 75 ohms, as described.....**$0.40**

The double pole receiver No. 1030, which we illustrate above, is of course more powerful than the No. 1024 type. The No. 1030 receiver is wound to 75 ohms and has two powerful magnets and double poles, but in all other respects it is practically the same as our No. 1024. This telephone receiver is suitable for all kinds of telephone work where a powerful double pole receiver is wanted and is also found of great use in wireless telegraphy where a low resistance receiver is desired.

No. 1030 75 ohm receiver, as described. Price.....**$0.75**

The No. 1024a receiver illustrated above has been especially designed for wireless work; it is a single pole receiver with a very powerful magnet. It is wound with No. 40 enamel wire and the resistance is guaranteed. Two binding posts are furnished. As this receiver is only to be used with a head band no hook is furnished. These receivers are carefully built and are especially recommended with galena and silicon detectors, where a double pole receiver is not always necessary.

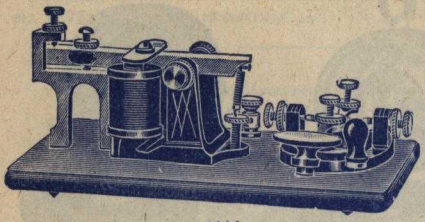
No. 1024a Pony receiver, 1,000 ohms, as described..... **1.00**

For headbands to fit any of the above receivers see page 15.

Dear Sirs: **Lakefield, Minn.**

Received your No. 1024 receiver in good condition. IT IS A PEACH. Your zinc spark gap IS ALSO A FINE ONE. I will soon purchase some other things of you. Yours very truly, L. LAFOT.

"ELECTRO" COMBINATION TELEGRAPH SET.

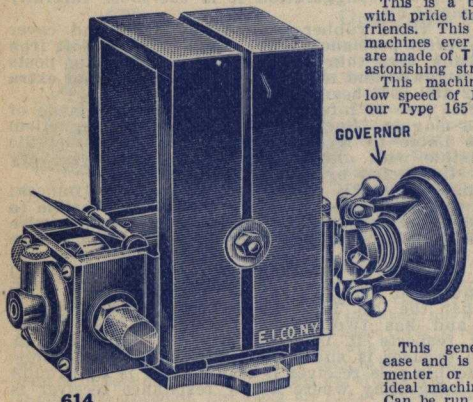


1114

This set is probably the most practical and useful for learners as well as for actual use that is constructed at the present time. It will work perfectly with one cell of battery. The key is our solid trunnion steel pattern and practically the same as used all over the country. The sounder is made nearly the same as standard sounders with the difference that it has not the special resonance base nor the rubber shields around magnets; in all other respects it is the same. Our cut clearly shows this first class outfit better than words can describe it.

No. 1114 "Electro" Telegraph Set, 5 Ohms, price.....$1.50
No. 1115 "Electro" Telegraph Set, 20 Ohms, price..... 1.75

THE "ELECTRO" GENERATOR



614

This is a brand new article, and it is with pride that we introduce it to our friends. This is one of the most powerful machines ever constructed and the magnets are made of **TUNGSTEN STEEL**, having an astonishing strength.

This machine is constructed to run on low speed of 1,800 to 2,000 revolutions and our Type 165 at this speed will develop a voltage of **16 to 18 and from 4½ to 5 amperes guaranteed.**

The Type 614 at the same speed develops **5½ to 6 volts and 14 to 15 amperes.**

A leather friction pulley with governor is supplied with this machine, and it is built honestly and strongly throughout. **NOT A TOY.** There are two generous oil-cups, large bearings and a carefully made commutator with copper woven brushes.

This generator runs with astonishing ease and is just the thing for the experimenter or for the practical man. An ideal machine to charge storage batteries. Can be run from 8-10 hours at a stretch.

The Type 165 will run from 6 to 7 18-Volt Tungsten lamps at a time, while the Type 614 will run from 15 to 16 6-Volt 2 C. P. lights.

Size over all, 10¼ in. x 4½ in. x 6 in. Net weight 12 pounds.

GUARANTEE—Buy this machine and if it is not all what we claim in any respect your money will be refunded without question.

This machine can be run either from surplus power of a gasolene engine or else from a powerful water motor or any other sufficient power.

No. 165 "Electro" Generator, 16 Volts, 5 Amperes (80 Watts) Price $9.80
No. 614 "Electro" Generator, 6 Volts, 14 Amperes (84 Watts) Price $9.80

Troy, N. Y.

Dear Sirs:

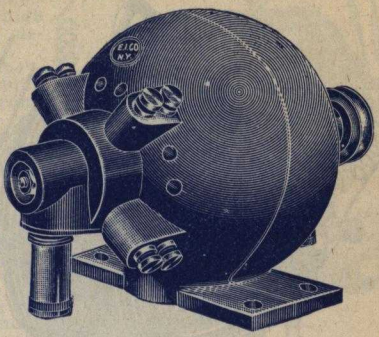
I received the dynamo IN GOOD ORDER. Am MUCH PLEASED WITH IT. Very truly yours,

ARNOLD VAN DENBURGH.

The "Electro 8-10" Dynamo

(Improved Type.)

When we come out flat-footed
d say that this machine is the
ry finest low voltage dynamo
this country, we make the
atement without reserve. No
lthough," no "ifs," no "buts."
The "Electro 8-10" is a marvel
l through. It is built like a
atch, and solid as a gun. For
orkmanship, efficiency and last-
g qualities it stands on the
ry peak of excellence. But
ords and praise alone won't do
you must have seen the ma-
ine, you must have "lifted" it
id you must have seen it run,
appreciate it. We say **seen,**
cause it works so marvelously
sy, that it can hardly be heard
hen it runs at full speed, under
ll load.



810

Wherever there is surplus
ower, be it gasolene engine,
rge electric motor, water-
heel, wind-motor, water-motor, etc., etc., the "8-10" can be used to
ght a bunch of Tungstens, **to charge the biggest storage battery,** to
ectroplate, to run spark coils, etc.

As a motor when run on 8 volts, the No. "8-10" will prove an ex-
edingly strong machine. We furnish this dynamo giving 8 volts and
amperes, that is 80 watts.

With the No. "8-10" machine, we were able to do the following:
At 2,000 revolutions we lighted fifteen 8-volt 4 C. P. Tungsten lamps.
At the same speed we also lighted six 6-volt 8 C. P. Tungsten lamps.
he full 80 watts capacity is obtained at about 2,500 revolutions.

POINTS OF SUPERIORITY.

Armature constructed of thin annealed electrical steel. Slotted for
nductors. Coils are **form wound,** connected up in the usual drum
anner. Laminations are **keyed** to shaft. Commutator pinned.

Shaft unusually large for this size machine. 5/16 in. diam. at all
oints. Material—steel **ground** to size. Commutator same construction
s on large dynamo. Hard drawn copper segments, heavily insulated
ith mica. Bearings "Non Grain" bronze, best obtainable.

Extra large wick feeding oil cups. Retaining grooves prevent oil
ying, and returns are provided so that excess oil returns to oil cup.

Field Magnets—Four pole laminated same as armature. Construction
llows for adjusting field magnet to obtain non-sparking point on com-
utator. 12 part armature and commutator.

Brushes—8 combination carbon and copper, of square sections to
revent turning. Double brushes and multi-polar construction allows
rge brush contact surface with small commutator for the comparatively
eavy currents encountered on low voltage work.

Case—Cast iron in two parts, cast from die moulded patterns, there-
or no damaged patterns ever used. Winding—Shunt.

Machine is entirely enclosed, practically dustproof, a radical de-
arture in dynamo building.

Pulley, 2 inches diameter, V-grooved for round belt.

Size over all is 7x4x4 inches. Weight is 8 lbs. net.

o. 810 "Electro 8 Volt 10 Amperes Dynamo." as described....**$10.00**

---

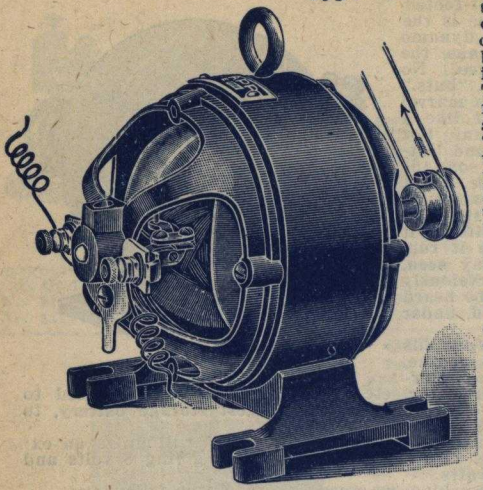
ear Sirs: **West New Brighton, Staten Is., N. Y.**

**I find YOUR GOODS THE VERY BEST OBTAINABLE, ESPECIAL-
Y IN WIRELESS. You may rely upon me as a regular customer.**

Sincerely yours, FRANK WATSON.

"Electroport" Dynamo.

Type "S"



1331

This dynamo for a score of years has been one of the best articles that we have put before the discriminating experimenter. There is absolutely no machine that can come anywhere near our "Type S," either in workmanship or output, considering its price. Our annual sales now amount close to 3,000 machines—proof of its immense popularity.

The machine can be put to a variety of uses. When belted to a gas or other engine, or anywhere where there is surplus power, the type S will light from 10 to 12 six volt tungsten lamps at a time. It will electroplate nicely up to a gallon plating bath and it will successfully charge small storage batteries. As a dynamo it may be run from 4 to 6 hours at a stretch and it will not be found to heat up unduly. When operated as a power motor it will develop an astonishing amount of power at six volts. Not more than 8 volts should be used.

The dynamo is semi-enclosed, after the latest designs of large machines. The watt output (36) is sufficient for practical use; the price is within the reach of every experimenter.

The armature is made from steel laminations, 1¾" diameter, six slots; with ¼" shaft.

The windings are dipped in insulating varnish and baked, as a guarantee of best results..

The pulley is 1" diameter and grooved; with a 3/16" round belt, the machine may be connected to a gas engine, a sewing machine or other driving power.

The dynamo is efficient, strongly made and handsomely finished in black hard enamel. It is equipped with an adjustable rocker-arm, to adjust the brushes which ensures the proper commutation and thereby the best output of the dynamo. Size over all 5 in. x 5 in. x 5 in.

Approximate output at 3,000 revolutions:

Open Circuit 8 volts. Safe maximum load 6 volts, 4 amperes.

No.		Price
1331	Type "S" Complete, packed in wooden box.....	$3.70

Camden, N. J.

Dear Sirs:

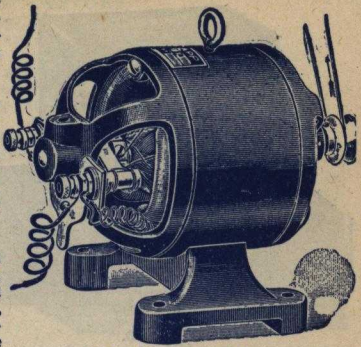
I received the pulley for the type S. Dynamo which you sent me and thank you very much for the same. I have tried my dynamo and find it VERY SATISFACTORY. I AM SATISFIED IN EVERY WAY WITH THE GOODS I RECEIVED FROM YOU. Hoping to oblige you with future orders, I am sincerely yours, CLARENCE BAITTINGER.

"ELECTRODYN" DYNAMO.

This Dynamo, while not as powerful as our type "S," is, considering its low price, the most wonderful value offered by us. It is high grade in all respects and will delight you.

As with our other electrical novelties, this Dynamo is a miniatured duplicate of machines in actual commercial operation.

The type "D" Dynamo may be attached to a gas engine, water motor, a sewing machine or other driving power.



1320.—Type D.

Points of Construction.

Field—Cast solid, with coils form wound and connected in multiple. Armature, 1½ inches diameter, drum type, six slots, laminated. Shaft, .188 diameter. Brushes—spring tension. Rocker arm—for turning the brushes to the best lines of commutation. Pulley ¾ inch diameter, grooved for 3/16 inch round belt. Finish—black enamel. 4½ inches high, including base and ring. 3⅛ inches diameter, less base and ring.

Approximate output at 3500 revolutions: Open circuit, 7 volts. Safe maximum load 4 volts, 1½ amperes. Will light five 4-volt tungsten lamps.

As a power motor it runs at high speed on 6 volts.

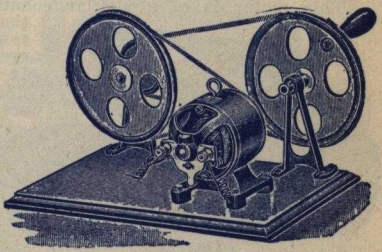
The shunt connected fields increases the power at slow speed. If changed to series, high speed may be obtained. (Weight boxed, 4 lbs.)

1320. Type D, as described..... **$3.00**

ELECTROPORT HAND POWER

Invaluable for experiment and demonstration. A practical and inexpensive double transmission with which the operator can easily obtain the required speed at the dynamo.

The ¼ in. spiral spring belts eliminate all unnecessary friction and are used under a tension of about 1½ times their length. The two large pulleys are 6 in. diameter. The small one 2 in. diameter. The base is 12 x 7 in. and as the pulleys are formed from sheet steel, combine strength and beauty.



9201

Our regular stock dynamos types D and S are interchangeable with the driver.

No. 9201 Electroport Hand Drive (less dynamo), as described.... **$2.50**
(Shipping weight, 4 lbs.)

No. 9202 Electroport Hand Power and Type "S" Dynamo..... **6.10**

No. 9203 Electroport Hand Power and Type "D" Dynamo..... **5.40**

No. 9116 Extra belts, 18 x ¼ in., each..... **.25**

Simsbury, Conn.

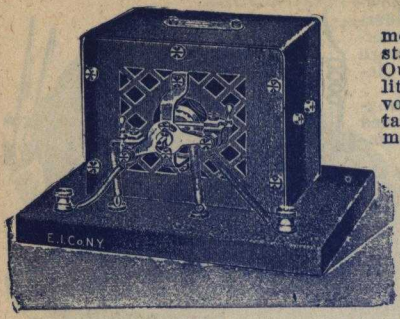
Dear Sirs:

The spark coil was VERY SATISFACTORY which you sent me.

Yours truly,

HEWITT FEARN.

Twentieth Century Motors

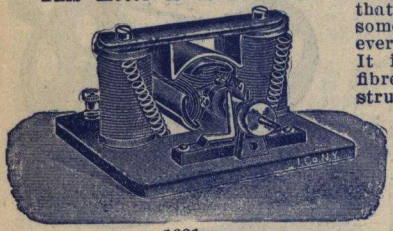


1880.

These motors are the latest models manufactured now and stand in a class by themselves. Our No. 1880 is a very powerful little machine working on two volts, 5 amperes minimum and takes about two dry cells. The maximum current that should be used is 6 V. 10 amperes. This motor is built with the utmost care and has all the latest improvements. It has an adjustable rocker arm so that the brushes can be changed to any angle, making it possible to get almost any speed. The base as well as the casing is entirely of metal, not a particle of wood being used. Only metal and hard fibre enters in its construction. The armature is of three sections and the commutator is very heavy. The bearings are of brass and very solid. The fields are wound with enamel wire after the latest standard in motor building. The motor itself is air cooled. Our motor is furnished with a handsome brass plate, same as large motors, giving the voltage and amperage; the base and casing is finished in bright red enamel. Our illustration does little justice to this motor and it must be seen to appreciate its beauty. The weight is ¾ lb.; size, 3¾x3¾x2¼ inches.

Metal Casing and Metal Base

No. 1880 Twentieth Century Motor, as described, each.....**$1.75**



1881.

This motor is of a similar construction as our No. 1880 except that it is not encased and that it is somewhat lighter. Its power, however, is about the same as No. 1880. It is built entirely of metal and fibre, no wood entering in its construction. There are two heavy field electro-magnets and the armature is of three sections, having heavy commutator. The brushes are adjustable and the tension can be adjusted quite readily. The motor is built in such a manner that the connections can be changed to either series or shunt, simply by loosening two nuts. The bearings are quite heavy and are all brass. We greatly recommend this little motor to drive models for instruction, experimenting, etc. This motor runs well on one battery and will develop astonishing power on three dry cells.

The base is of heavy metal, finished in bright red enamel. The electro-magnet standards are likewise finished in bright red enamel, all of which greatly enhances the beauty of the motor.

Weight, ¾ lb.; size, 3¾x3¾x1¾ inches over all.

No. 1881 Twentieth Century Motor, as described, each.....**$1.25**

United States Naval Academy.
Annapolis, Md.

Dear Sirs:

The type "8" Dynamo IS WORKING IN FINE CONDITION. I use it to run small electric trains, motors, etc. Please send me your catalogue and a number of your order blanks.

Yours respectfully, KENNETH COONTZ.

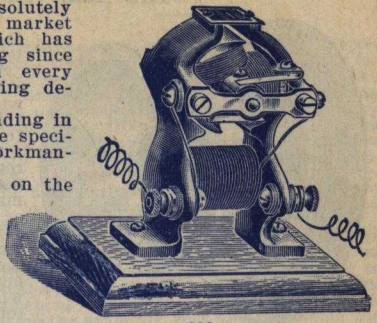
"ELECTRO" MOTORS.

The motors we list below are absolutely the best American make on the market to-day. Built in a factory which has devoted itself to motor building since 1890. We guarantee each and every motor and will replace any proving defective on its own accord.

This well-known motor, ever leading in efficiency and value, is a complete specimen of electrical science and workmanship.

The binding posts are mounted on the field, to avoid disturbing the connections when it is desired to use the motor without the base.

It is 3½ in. high, finished in black enamel, with nickel-plated trimmings. Has a three-pole armature, causing the motor to start without assistance when the current is applied.



100

The ⅛ in. shaft is fitted with a pulley for running mechanical toys, models, etc. and drives a fan at a high rate of speed.

One 1001 dry cell or a cell that will run any motor will drive this motor at prodigous speed.

No. 100 "Electro" motor, as described.....$0.85

"ELECTRO" "O. K." MOTOR.

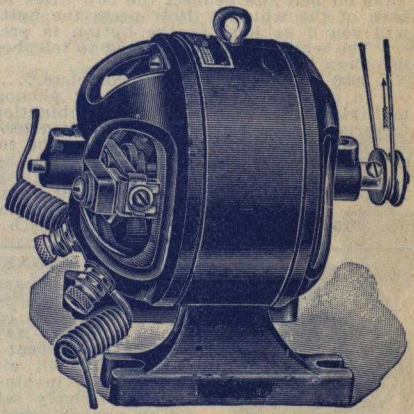
It has taken experienced engineers many years of careful study to develop the highly efficient motors of the present day.

The O. K. is a very close copy in miniature, and its operation will be found pleasing and educational. It is an extremely powerful model. Every boy wants one at sight.

The armature is laminated, three pole, 1¼ inch diameter. Shaft ⅛ inch diameter. Pulley 9-16 inch, grooved.

The finish is black enamel, with nickel plated trimmings. Height 4¼ inches.

One 1001 dry cell will drive the motor or two cells when more power is required.



No. 179 "Electro" O. K. motor 2 to 4 volts, as described. Price $1.45

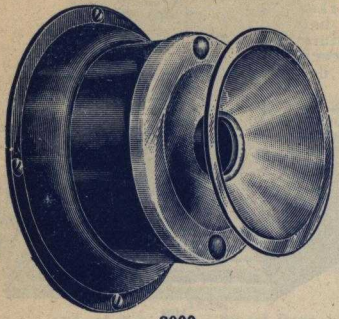
Gentlemen: Kenosha, Wis.

The instruments arrived a few days ago and after giving them a pretty thorough test, I think that I can justly say, THAT THEY ARE SATISFACTORY IN EVERY RESPECT.

Let me say to whom it may concern, that this statement is absolutely unsolicited on the part of the ELECTRO IMPORTING CO., being entirely voluntary on my part.

Yours respectfully, SIDNEY DERBYSHIRE.

THE "ELECTRO WHISTLE."



3000

The "Electro Whistle" now takes the place of the old fashioned, noisy bell which scares you every time it "goes off." The new whistle gives a beautiful, clear, harmonious sound which is, despite its softness, penetrating and can therefore be heard further than the regular bell.

Besides, our new whistle can be regulated at will to give a very deep sound resembling the one made by a small automobile horn, or a very high clear tone resembling a cornet. Nothing better could be made to replace the house bell, as the sound of the whistle can be heard through the whole house without difficulty. The beautiful tone is a pleasant surprise to everybody.

The "Electro Whistle" can be installed in fifteen seconds. It takes less current than an ordinary bell; the contacts are made of heavy platinum and we guarantee the whistle free from all defects for six months.

It works perfectly with two dry cells and not more than four cells should be used.

To install: The same as the ordinary bell. To replace with bell: Take off bell and connect the two wires to the two binding posts in the base of the whistle. Now press the button and the "Electro Whistle" will sound as long as the button is pressed down.

The whistle can be attached to telephones, or put in place of buzzers in offices, schools, etc.

No. 3000 "Electro Whistle," complete.....$0.95

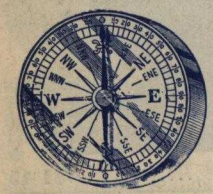
In connection with a standard phonograph horn the sound will be multiplied enormously. This combination is especially adaptable for factories, or in places where much noise is experienced.

We furnish our whistles with tube to take the horn without additional cost. The order should state whether whistle is desired with tube or with bell.

No. 3003 "Electro Whistle" (without horn) but with tube to take standard phonograph horn, same prices as No. 3000.

No. 3010 Horn to fit No. 3003, price, each.....$0.35

MAGNETIC COMPASS.



1325

This fine compass which should not be judged by its low price is an exceedingly accurate instrument. The compass is imported by us, which explains its low price.

Each instrument is warranted to be accurate. Its needle will always point NORTH, and it therefore is invaluable for orientation purposes. It is extremely sensitive. The magnetic action of an electric street car 300-500 yards away will deviate the needle. The metal casing is nickel plated and highly polished. Size 2¾-in. diameter. ½-in. thick.

No. 1325 Magnetic Compass, as described.....$0.15

Victoria, N. C., Can.

Dear Sirs:

Your Electro Whistle which I purchased some time ago works with GREAT SATISFACTION. Your Rheostat Regulator also WORKS BEAUTIFULLY to regulate the speed of small motors.

Yours respectfully, M. M. CHRISTIE.

951

"Electro" Bells and Buzzers

The frame is made of special soft iron, Nickel Plated, so constructed as to form a support for the Magnets, and the trunion for swinging the Armature and also forming one of the binding posts *all in one piece.* It is made by machinery automatically from the sheet to the finished article, thus eliminating the unreliable human factor and making all bells absolutely uniform. Also giving a perfect soft iron magnetic and perfect electrical circuit without any loose joints and removing the cast-iron base from the circuit.

The armature and striker-arm are made in one piece automatically from special soft iron with the striker-arm hardened by rolling to give it a spring temper which is necessary for permanent adjustment and clear ring, but leaving the armature very soft, increasing the efficiency of the bell and rendering it impossible for it to become permanently magnetized.

The "Electro" Buzzer is the same as the bell, but without gong.

No		Price
951	"Electro" Bell, 2½ in. gong	$0.25
952	"Electro" Bell, 3 in. gong	0.27
953	"Electro" Bell, 4 in. gong	0.32
954	"Electro" Buzzer	0.24

"Electro" Call Bell Outfit.

Consisting of one "Electro" Box Bell, 2½ in. gong, one cell dry battery, 2½x6 in., one polished hardwood push button, 50 feet No. 18, pure copper insulated wire, sufficient screws, staples, etc., all packed in strong cardboard box; weight five pounds. The very best and cheapest outfit on the market.

Do NOT order one of these outfits singly without other goods, as the transportation charges make it unprofitable.

No.		Price
1000	"Electro" Call Bell Outfit, complete	$0.60

1000

New Mexico.

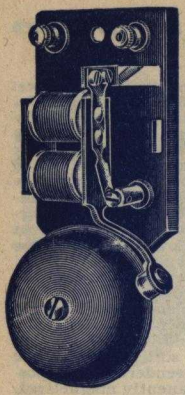
Dear Sirs:

Received orders ALL RIGHT AND I AM WELL PLEASED.

Yours truly,

RALPH SAFFEL.

THE "ELECTRO LILLIPUT" BELL.



955

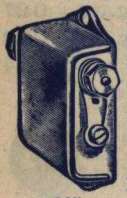
The smallest bell in the world! The gong of the bell is 1 inch in diameter, and the other parts in proportion. The cover and base are stamped cold rolled steel. The hammer rod and armature are in one piece. The prong edges of the cover spring tightly into the slots of the base; the hammer rod passes through the side of the base at right angles; the opening is but slightly larger than the rod, so that this, as nearly as possible, is a dust and insect proof bell.

The tension is easily altered. The contact adjustment is held securely by a heavy spring nut. **Gongs are of brass, heavily nickel plated, contact of contact post is of silver.** The best workmanship and material is embodied in these bells. Wound to 3 ohms.

Two small but neat brass binding posts are furnished; magnet spools are wound in bright green silk wire. Cover and base are finely japanned. In addition the cover is handsomely decorated.

No. 955 The "Electro Lilliput" Bell, as described, full nickel finish. $0.32

THE "ELECTRO" LILLIPUT BUZZER.



965

These buzzers are similar in construction to our Lilliput bells, but without the gong. The design is similar as well as the general details. The cover and base are made of stamped cold rolled steel. The tension is easily altered, and the contact adjustment held securely by a spring nut. The ribbed edges of the cover spring tightly over the base, making it likewise readily removed, allowing inspection and adjustments of the moving parts if desired. This is just the buzzer to use for testing the minerals of the *receiving wireless set*, as it is compact and very neat. Wound to 3 ohms. Base is japanned, cover nickeled.

No. 965 The "Electro Lilliput" Buzzer, full nickel finish... **$0.50**

THE "ELECTRO" WATCH CASE BUZZER.

950

The highest grade of material and workmanship has been incorporated in the "Electro" watch case buzzer illlustrated in the cut. The buzzer has a solid brass case, beautifully and durably nickel-plated. The springs are made of phosphor bronze, with pure silver contacts, assuring long life to the buzzer. The insulation is perfect.

This buzzer is unequalled for a portable testing instrument, as it may be carried in the pocket without inconvenience. It is suitable for any work requiring a compact and neat buzzer. The sound is very loud, and as clear as that obtained from buzzers of larger dimensions.

No. 950 "Electro" Watch Case Buzzer..... **$0.40**

Calais, Me.

Dear Sirs:

I received my order AND WAS VERY MUCH PLEASED WITH IT, and all of my friends think IT IS FINE, and they say they are going to have one too.

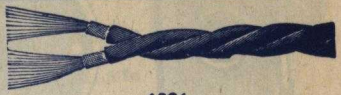
WILLIAM B. WELCH.

No. Price

020 1 conductor rubber insulated; 14 ireads, No. 34 finest copper wire, nished in green silk braid cover, er yard 4C

1020

No. 1021 2 conductors rubber insulated; 14 No. 34 copper wire, in strands with silk braid covers in green, per yard. 6C



1021

Composed of one conductor of 9 No. 36 Copper Wires stranded with gray colored Cotton Braid Cover.

1022

1022 Single Conductor Flexible Cotton Covered Cord..Per yd., $0.03

Composed of 50 No. 32 Copper Wires with Green colored, Silk Braid Cover. For Rheostats and storage batteries, etc., where flexible conductors are required to carry heavy currents.

1023

1023 One Conductor Silk Covered Flexible Cord.....Per yd., $0.10

Composed of one conductor of 18 strands of gilt Tinsel and three No. 36 Copper Wires twisted together with Purple Worsted Braid. Used on telephone receivers, etc.

1027

1027 Single Conductor Cotton Covered Tinsel Cord....Per yd., $0.05

Composed of two conductors, Tinsel Cord. Each conductor insulated with cotton braid, the whole outside covered with Green Silkene Braid. Used on telephones, wireless, etc.

1028

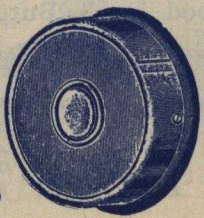
1028 Two Conductor Tinsel Cord.....Per yd., $0.09

PRESSED BRONZE PUSH BUTTONS.

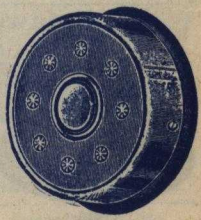
These buttons are used where the ordinary wood push would not be ornamental enough, as in parlors, offices, etc. Honestly and well made, high polish, wood base polished, push ivory imitation. Cuts are ½ actual size.

No. 169 Pressed Bronze Push, as described, each $0.20

No. 170 Pressed Bronze Push, as described, each .23



169



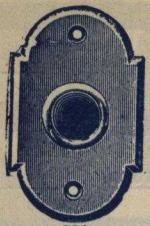
170

Crawfordsville, Ind.

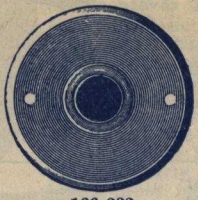
Dear Sirs:

Please send me your electrical encyclopedia. Goods sent me last summer were ABSOLUTELY PERFECT. Yours PAUL FANCH.

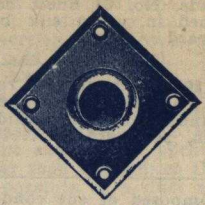
METAL PUSH BUTTONS.



221



166-232



168-234

This entirely new line of metal pushes will surely be welcomed by most of our friends. They are highly ornamental and are used on residence entrances, in parlors, offices, etc. The Nos. 221, 166, 168 come in cast heavy bronze, highly polished only. The Nos. 232, 234 come in stamped nickel metal, highly polished. These are not as heavy and massive as the bronze models.

The pushes used on these plates work on a novel principle and project only 3/16 inch above the face of the plate. The back of the push extends only ⅝ inch (over all), consequently no deep holes need be bored, as with some of the older models. Illustrations are ½ actual size.

No. 221 Bronze Push Button, as described (see cut), each..... $0.30

No. 166 Bronze Push Button, as described (see cut), each..... .35
No. 232 Nickel Push Button, as described (see cut), each..... .19

No. 168 Bronze Push Button, as described (see cut), each..... .35
No. 234 Nickel Push Button, as described (see cut), each..... .20

LILLIPUT PUSH.

174

The smallest metal push button made, also the neatest and best. Cut shows actual size. Only ½ inch high over all, ⅝ inch diameter. Fits any ⅝-inch hole. Used on all our metal push plates. It is made entirely of brass. Handy on instrument bases, etc. Has two small binding posts on back. Contact positive at all times on account of large contact plate. A push you will surely like.

No. 174 Lilliput Push, as described, each..... $0.15

Harawood Push Buttons—Polished.

1008

Size 2⅛ inches, excellent finish, especially elastic German Silver springs, insuring good contacts.

No.				Price
1008	Push	Button,	Walnut.....	$0 06
1009	"	"	Ash.....	06
1010	"	"	Cherry.....	06
1011	"	"	Antique Oak.....	06
1012	"	"	Oak.....	06
1013	"	"	Mahogany.....	06

Bar Harbor, Me.

Dear Sirs:
Order received to-day. EXTREMELY SATISFACTORY.
Respectfully yours,
ALBERT STEVENS.

Midget Jr. Button

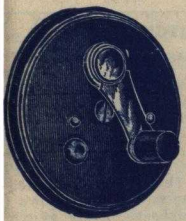
4285

For ¾ inch hole. Held by strong side springs. The best seller on the market. Simply drill a ⅝" hole. Midget Jr. does the rest. It holds firmly. Has fine mother of pearl button, and binding posts to grip any size wire.

No. **4285** Midget Jr. Push as cut, each..... **14c**

In 12 lots, each....13c **In 50 lots, each....11c**

Battery Circuit Switches.

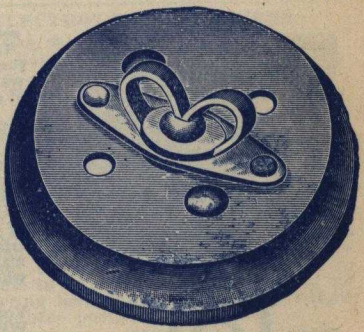


1015

These switches are used for opening and closing bell circuits, to start small motors, miniature incandescent lamps, etc. Polished round hardwood base made in Ash, Oak, Cherry and Walnut.

No. **1014**	1 point switch, 2¼ in diameter			**$0 07**
" **1015**	2 " " " " "			**08**
" **1016**	3 " " " " "			**09**
" **1335**	4 " " " " "			**10**
" **1336**	5 " " " " "			**12**
" **1337**	6 " " " " "			**12**

"Crown" Switch.



1286

Without a doubt this switch is the best snap switch on the market today.

The arm is held securely in place by a spring clip.

The ends of the arm are concaved, fitting over the points, ensuring a perfect contact and a quick, sharp break.

The only double break, single pole, bell switch made.

Round head screws to match furnished.

It is made entirely from metal and fibre, no wood entering in its manufacture.

It is entirely nickel plated and polished.

No. **1286** Crown Switch, complete..... **16c**

This switch is very desirable in connection with our lighting outfits.

Greenfield, Ohio.

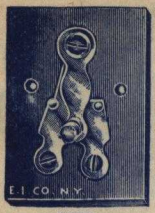
Gentlemen:

I received the goods. EVERY ARTICLE WAS O. K.

Yours truly,

CLEM. THOROMAN.

THE "ECONOMIC" BATTERY CIRCUIT SWITCH.



1882

This switch is the cheapest manufactured, and while we do not claim it to be as good as the other point switches we list you will find it quite satisfactory for all-around work, especially where a high class switch is not desired. It is the cheapest switch made anywhere and must be seen to really appreciate how such a switch can be made for such little money. We only furnish this in a one-point style, as our illustration shows. The metal parts are well nickel plated and polished. The base is of chestnut, well varnished and polished. Size 2¼x1¼ inches. Thickness of the base ⅜ inch. Weight ¾ ounce.

No. 1882 "Economic" Battery Circuit Switch, as described, each.....6c

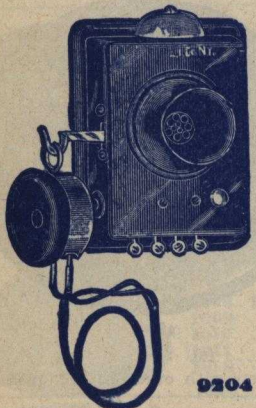
THE "ELECTRO" MIDGET SNAP SWITCH

178

This is the smallest electric switch manufactured anywhere. It takes up less room than any other switch, and is one of the neatest articles of the class we have ever seen. It gives a snap-double break, and there is nothing but metal and fibre used in the making of this switch. It is specially desirable on instrument tables, for apparatus bases, etc., wherever there is but little room to spare. It is also used with small lighting outfits, and for a hundred other uses, which readily suggest themselves. The size over all is ¾" x ¾", the height of the body proper from top to base is but ½". The weight is less than ¼ ounce. There are two holes in the base to screw or nail down the switch. The finish is brass polish throughout. Every switch is guaranteed. No. 178. "Electro" Midget Snap Switch as described:—

Each **$0.15**

Telimphones.



9204

We confess that we are proud to present to our friends our new **ALL METAL** "Telimphones." For several years we handled the old-fashioned wooden phones, which warped and buckled every time it rained, and of course—failed to work.

In our efforts to present something to our friends that could only fail to work by using a sledge hammer, the all-metal "Telimphones" were produced, made out of pressed steel, beautifully oxidized. They are impossible to get out of order, and we GUARANTEE to replace every set inside of a year, if it should fail to give full satisfaction. All "Telimphones" are machine made. Only fibre and metal used—no wood whatever.

Our cut does the Phone little justice. You must see them to appreciate their value. Will work up to 4,000 feet, for 2 party line only, 2 dry cells used at each end. Wiring diagram with each set.

No. 9204 Complete "Telimphone," One Station $2.00

No. 9204a Two stations, complete, 3.75

N. B. Two stations are required for two persons to communicate with each other.

Duluth, Minn.

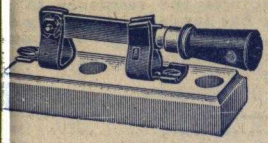
Dear Sirs:

I have received the shipment and beg to advise you that everything was O. K. and you will be favored with my further order.

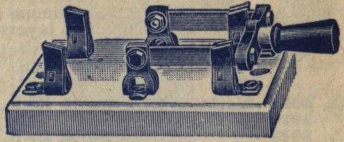
STANLEY GRAINE.

Porcelain Base Switches

For Wireless and Lighting Currents.
Carry 15 Amperes, 125 Volts.



1310



1313

These switches are used a great deal in small wireless stations, as he insulation is perfect. No spark can jump across as the distance is oo great.

For **Wireless** we especially recommend our No. 1313 for intercommunicating. It works as follows: Connect the two leads from the park gap to the two left posts of switch. Then connect the two leads rom the receiving apparatus to the two right posts of switch. To the wo centre posts connect each the ground and aerial. If the switch rm is on right side the station is set for receiving; the coil is entirely cut out. If switch arm is on left side the station can send; the eceiving instruments are cut out. This is the best and quickest method.

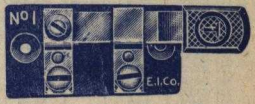
Metal parts are of pure copper. Several unique features are embodied in these switches which strengthen them and make them very esirable.

		Price, each
No. 1310	15 Ampere Single Pole, Single Throw	$0.14
No. 1311	15 Ampere Single Pole. Double Throw	0.24
No. 1312	15 Ampere Double Pole, Single Throw	0.20
No. 1313	15 Ampere Double Pole, Double Throw	0.30

"ELECTRO" BABY SWITCHES.

No. 5

Our new "Electro" Baby Switches undoubtedly fill a long felt want. For simplicity, neatness and high grade appearance they are unmatched. They are no doubt the smallest switches of this kind on the market to-day. The bases are of molded hard rubber composition. All metal parts are of pure copper. Switch handles are rubber insulated. The No. 5 switch is remarkable for its novel quick-throw movement, and there are three snap-catches to keep the handle in any of the three positions, no amount of jarring being able to loosen the handle in any of the three positions.



No. 1

AN IDEAL WIRELESS DETECTOR SWITCH.

Size of base of No. 5 is 1¾" x 2¼". Size of base of No. 1 is 1 1-16" x 2 1-16".

		Price, each
No. 1	S. P. S. T. "Electro" Baby Switch	$0.16
No. 5	S. P. D. T. "Electro" Baby Switch	0.26

Crystal Springs, Miss.

Gentlemen:

Enclosed please find 4c for one of your latest catalogues. I have bought SOME OF YOUR GOODS AND KNOW WHAT THEY ARE. I need some wireless instruments now. Hoping to receive your catalogue, I am,

Yours very truly,

ISAAC RISER.

Wire and Cables.

1018

Our wires are nearly all imported and are made exclusively of chemically pure copper, the best procurable, which reduces the resistance to a minimum; especially fine insulation consisting of two layers of cotton, woven in opposite directions and insulated with best parafine wax; comes in 1 lb. rolls only.

No. 1017	Insulated Wire,	No. 16, 105 ft., per lb.	$0.34
" 1018	" "	No. 18, 155 ft., per lb.	.36
" 1019	" "	No. 20, 239 ft., per lb.	.38

NUMBER, DIAMETER, WEIGHT, LENGTH and RESISTANCE of COPPER WIRE

GAUGE.	DIAMETER.	Sectional Area.	CAPACITY.	OHMS.			FEET		POUNDS.	
B.& S. No.	In 1000ths	In Circular Mils.	In Amp.	Per 1,000 Ft.	Per Mile.	Per Pound.	Per Pound.	Per Ohm.	Per 1,000 Ft.	Per Ohm
0000	.460	211600.	312.	.04906	.25903	.000077	1.56122	20497.7	640.51	12987.
000	.40964	167805.	262.	.06186	.32664	.00019	1.9687	16255.37	507.95	8333.
00	.3648	133079.	220.	.07801	.41187	.00019	2.4834	12891.37	402.83	5263.
0	.32486	105534.	185.	.09831	.51909	.00031	3.1303	10223.08	319.45	3225.
1	.2893	83694.	156.	.12404	.65490	.00049	3.94714	8107.49	253.34	2041.
2	.25763	66373.	131.	.1563	.8258	.00078	4.97722	6429.58	200.91	1282.
3	.22942	52634.	110.	.19723	1.0414	.00125	6.2765	5098.61	159.32	800.
4	.20431	41743	92.3	.24869	1.313	.00198	7.9141	4043.8	126.35	505.
5	.18194	33102.	77.6	.31361	1.655	.00314	9.97963	3206.61	100.20	318.
6	.16202	26251	65 2	.39546	2.088	.00499	12.5847	2542.89	79.462	200.
7	.14428	20817	54 8	.49871	2.633	.00792	15.8696	2015.51	63.013	126.
8	.12849	16510.	46.1	.6529	3.3	.0125	20.0097	1599 3	49.976	80.
9	.11443	13094.	38 7	.7892	4.1	.0197	25.229	1268.44	39.636	50.
10	.10189	10382.	32 5	.9441	4.4	.0370	31.8212	1055.66	31.426	37.
11	.090742	8234	27 3	1.254	6.4	.0501	40.1202	797 649	24.924	20.
12	.080808	6530	23.	1.580	8.3	.079	50.5906	632.555	19.766	12.63
13	.071961	5178	19 3	1.995	10.4	.127	63.7948	501.63	15.674	7 87
14	.064084	4107	16.2	2.504	13.2	.200	80.4415	397.822	12.435	5.00
15	.057068	3257	13.6	3 172	16.7	.320	101.4365	315.482	9.859	3.12
16	.05082	2583	11.5	4 001	23.	.512	127.12	250.184	7.819	1.95
17	.045257	2048	9.6	5.04	26.	.811	161.29	198.409	6.199	1.23
18	.040303	1624	8.1	6.36	33.	1.29	203.374	157.35	4.916	.775
19	03589	1288	....	8.25	43	2.11	256.468	124.777	3.899	.473
20	.031961	1021	....	10.12	53.	3.27	323.399	98 9533	3.094	.305
21	.028462	810	....	12.76	68.	5.20	407 815	78.473	2.452	.192
22	.025346	642	....	16 25	85	8.35	514.193	62.336	1.945	.119
23	.022571	509	....	20.30	108.	13.3	648 452	49.3504	1.542	.075
24	.0201	404	....	25.60	135.	20.9	817 688	39.1365	1.223	.047
25	.0179	320	....	32.2	170.	33.2	1031 038	31.0381	.9699	.030
26	.01594	254	....	40.7	214.	52.9	1300 180	24 6131	.7692	.0187
27	.014195	201	....	51.3	270.	84.2	1639.49	19.5191	.6099	.0118
28	.012641	159 8	....	64 8	343.	134.	2067.364	15.4793	.4837	.0074
29	.011257	126 7	....	81.6	432.	213.	2606.959	12.2854	.3835	.0047
30	.010025	100 5	....	103.	538.	338.	3287.084	9.7355	.3002	.0029
31	.008928	79 7	....	130.	685.	539	4414.49	7 72143	.2413	.0018
32	.00795	63.	....	164.	865.	856.	5236.915	6.12343	.1913	.0011
33	.00708	50 1	....	206.	1033.	1357	6590.41	4.85575	.1517	.00076
34	.006304	39 74	....	260.	1389.	2166.	8312.8	3.84966	.1204	.00046
35	.005614	31.5	....	328.	1820.	3521	10481.77	3.05305	.0956	.00028
36	.005	25.	....	414.	2200.	5469.	13214.16	2.4217	.0757	.00018
37	.004453	19.8	....	523.	2765.	8742.	16659.97	1.92086	.06003	.00011
38	.003965	15.72	....	660.	3486.	13772.	21013.25	1.52292	.04758	.00007
39	.003531	12.47	....	832.	4395.	21896.	26496 237	1.20777	.03735	.00004
40	.003144	9.88	....	1049.	5542.	34823.	33420.63	0.97984	.02992	.000029

The Resistance of Our German Silver Wire is About Eighteen Times That of Copper

Gentlemen: Dorchester, Mass.

I have bought several of your things AND FIND THEM VERY SATISFACTORY.

Yours truly,

ROBER CROSBY.

PRICES OF MAGNET WIRES (COPPER WIRE)

No. B. & S. Gauge	Diameter Bare	COTTON		SILK	
		Single	Double	Single	Double
14	.055	$0 40	$0 44	.....	.....
16	.050	0 42	0 46	$0 80	$0 92
17	.045	0 44	0 48	0 82	0 94
18	.040	0 45	0 50	0 84	0 96
19	.0358	0 50	0 60	0 86	0 98
20	.0319	0 58	0 64	0 88	1 12
22	.0253	0 62	0 74	0 92	1 22
24	.0201	0 68	0 84	1 02	1 38
26	.0159	0 80	1 00	1 20	1 65
28	.0126	0 92	1 20	1 40	2 00
30	.010	1 08	1 42	1 70	2 56
32	.0079	1 27	1 64	2 16	3 40
34	.0063	1 73	2 20	2 90	4 60
36	.005	2 12	3 00	3 93	5 98
38	.0039	3 60	5 70	5 58	8 43
40	.0031	6 00	9 00	8 14	11 53
50	.....	.....	.....	16 00	.....

Enamel Wire Prices Same as SINGLE SILK.

PRICES ARE PER POUND

OUR WIRE COMES ON SPOOLS

SAMPLE SPOOL

NOTE.—All our wire is furnished on heavy metal spools. Weights are as follows: Sizes 14-20 B & S are on 1 lb. spools; sizes 21-28 are on ½ lb. spools; sizes 29-40 are on ¼ lb. spools. These are the standard weights carried in stock and smaller quantities of the sizes as mentioned ARE NOT SOLD. If you wish 5 lbs. No. 20 wire we will send you 5 one lb. spools if you do not state that you desire it in one piece. The same rule is observed on other sizes. Please note this.

Prices of German Silver Resistance Wire. 18% Alloy

Bare	Size by B & S. Gauge
$0 78	1 to 4
0 78	5 and 6
0 78	7 and 8
0 78	9 and 10
0 78	11 and 10
0 78	13 and 14
0 78	16
0 80	18
0 83	20
0 98	22
1 08	24
1 11	26
1 40	28
1 75	30
2 35	32
2 95	34
6 50	36
18 00	38
30 00	40

To determine length and resistance, etc. consult table on preceeding page.

Black Enameled Wire.

This new wire, used on coils, tuners, etc., is one of the greatest inventions made of late. Instead of using cotton or silk covering, this wire is covered with a film of adhesive black enamel, very tenacious, which can never crack. The enamel takes up 90 per cent. less room than cotton insulation, consequently more wire may be wound into a given space, which greatly increases the efficiency of the apparatus.

PRICES.—The same as for single silk covered wires shown in above table.

Send 2-cent stamp for free sample.

LOOK

at the enormous saving in space in favor of

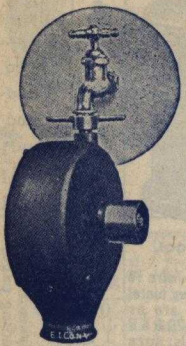
American Enamelled Magnet Wire

Washington, D. C.

Dear Sirs:

Order 20,219 I received O. K. Must praise the way THE WIRE WAS WOUND, as one firm dealing in fine wire, uses a machine which saves them time, but tangles and kinks the wire, so much, as to render ¼ to ⅓ of it useless. Yours truly, F. PELHAM.

The "Hercules" Water Motor



1492

Water motors have come into extensive use during the last years. They can be put to a great number of uses, and we suggest the few following ones: To run **Dynamos** in charging storage cells, to drive coffee mills, meat choppers, ice-cream freezers, window displays, revolving signs.

To run **Static machines,** vibrators, air pumps, scroll saws, drill presses, tool sharpeners, **lathes,** forge blowers, grindstones, churns, cream separators and 100 other similar appliances.

The power costs you nothing. The motor runs day and night. Nothing to wear out. Foolproof. A child can install our "Hercules" with ease.

We recommend our motor especially for use with our type "S" Dynamo, which, when run at full speed, will light 6-8, 6 volt, 6-10 C. P. Tungsten or tantalum lamps.

Our 4" motor, with a pressure of 80 lbs., develops 1-6 H. P. on a 2" water main; ⅛ H. P. on 1" main; 1-16 H. P. on ½" main.

The 6" motor on same pressure develops ½ H. P. on 2" main; ¼ H. P. on 1" main; ⅛ H. P. on ½" main.

If more pressure is available the amount of power increases proportionally. The usual pressure is from 60-90 lbs. In towns located near mountains or hills the pressure is usually from 90-120 lbs.

Our motors are the acme of perfection—on the market for eight years. Each guaranteed. Bearings are of bronze, castings of best iron that cannot rust. Finished in bright red enamel.

If not stated to the contrary, we furnish our motors to attach on ½" standard threaded faucet. If your faucet is not threaded you must use our universal coupling for plain faucets, which is **not** included in price of motor.

When ordering it is necessary to give EXACT OUTSIDE dimension (diameter) of faucet.

The regular ½ threaded coupling (furnished with each motor) has swivel arrangement by which motor can be turned in any desired direction.

This holds also true of the universal coupler.

The 4" motor is furnished only with V-grooved pulley. The 6" motor is furnished with flat pulley usually, but if your order states it, we can substitute V-grooved pulley or 2-flanged pulley (for flat belt, to prevent falling off of belt) at the same price.

Weight of 4" motor, 5 lbs.; weight of 6" motor, 7 lbs.

Both motors give 86 per cent. efficiency, which fact bear in mind when comparing it with cheap motors made to sell, but not made to furnish power.

No. 1493	Hercules water motor, 4", as described	$2.75
No. 1492	Hercules water motor, 6", as described	4.00
No. 1954	Universal coupling	.40
No. 1495	Endless round belt, 5 feet long, 5-16"	.40
No. 1406	Endless flat belt, 5 feet long, ¾"	.35
No. 1849	Wood pulley for flat belt	.30

Millville, N. J.

Dear Sirs:

I wish to thank you for THE PROMPT ATTENTION given our recent order. The order was mailed here on Wednesday, July 20th, and the goods reached us on Saturday the 23rd. Thanking you again for YOUR PROMPTNESS, I am,

Yours respectfully, CHARLES O. GIBBON.

PART THREE

RAW MATERIAL PARTS AND TOOLS

SUPPLIES

THE ELECTRO IMPORTING CO.
233 Fulton St.
Near Hudson Terminal
New York
U.S.A.

23 Rue Henri Maus
BRUSSELS
BELGIUM

METAL SHEETING, TUBING AND RODS.

BRASS.

BRASS SHEETING. Cut to any dimension. For less than ½ sq. ft. the price is figured per sq. inch. Not less than 25c. of one size sold.

Thickness	Price per sq. foot	Weight per sq. foot lb.	Weight per sq. foot oz.	Price per sq. inch
1/64 inch	$0.32	0	13	$0.01
1/32 "	0.51	1	9	0.01
3/64 "	0.70	2	5	0.01½
1/16 "	0.95	3	5	0.01½
3/32 "	1.38	4	11	0.02
1/8 "	1.80	6	11	0.02½
3/16 "	2.68	9	8	0.04
1/4 "	3.60	13	4	0.05
5/16 "	4.55	16	12	0.06
3/8 "	5.50	18	12	0.08

BRASS TUBING. Seamless. Cut to any length For less than ½ ft. the price is figured per inch. ID—Inside Diameter. OD.—Outside Diameter.

I D	O D	Price per foot	Weight per foot lb.	Weight per foot oz.	Price per inch
1/8 inch	3/16 inch	$0.14	—	1¼	$0.02
3/16 "	1/4 "	0.16	—	2	0.03
1/4 "	5/16 "	0.18	—	2¼	0.03
5/16 "	3/8 "	0.18	—	3	0.03
3/8 "	1/2 "	0.28	—	7	0.05
7/16 "	1/2 "	0.23	—	4	0.04
1/2 "	9/16 "	0.23	—	4	0.04
5/8 "	3/4 "	0.47	—	12	0.08
3/4 "	7/8 "	0.50	—	11	0.09
7/8 "	1 "	0.56	—	15	0.10
1 "	1 1/16 "	0.42	—	8	0.08
1 "	1 1/8 "	0.57	—	15	0.10
1 1/16 "	1 1/8 "	0.43	—	8	0.08
1 1/8 "	1 1/4 "	0.48	2	2	0.08
1 1/4 "	1 3/8 "	0.62	1	11	0.11
1 1/2 "	1 5/8 "	0.82	1	15	0.14
1 7/8 "	2 "	1.14	2	13	0.18

Not less than 20c. of one size sold.

BRASS TUBING. Square, Seamless, for constructing tuner sliders. One size on hand only. Outside measurement 5-16 in., inside measurement ¼ in. Fits all standard Tuner rods. For less than ½ ft. the price is figured per inch.

Price per foot .....30 cts.

Price per inch .....05 cts.

Weight per foot, 3 oz.

Gallitzin, Texas.

Gentlemen:

Order No. 68789 WAS RECEIVED O. K. THANKING YOU FOR ATTENTION TO SAME.

MR. J. W. NORDSTROM.

BRASS ROD. Round. Cut to any length. For less than ½ ft. the price is figured per inch. Over 2 ft. discount 10%. **Not less than 20c of one size sold.**

Diameter	Price per foot	Weight per foot		Price per inch
		lb.	oz.	
3/32 inch	$0.03	—	1	$0.01
1/8 "	.04	—	1	.01
5/32 "	.04	—	1½	.01
3/16 "	.07	—	2	.01
7/32 "	.09	—	3	.02
1/4 "	.10	—	4	.02
5/16 "	.14	—	6	.02
11/32 "	.18	—	7	.03
3/8 "	.24	—	8	.04
7/16 "	.28	—	12	.04
1/2 "	.28	—	15	.04
5/8 "	.45	1	7	.07
3/4 "	.56	2	3	.09
7/8 "	.76	2	13	.12
15/16 "	.90	3	5	.14
1 "	1.05	3	13	.18
1 1/4 "	1.50	5	13	.24
1 1/2 "	2.20	8	5	.36

BRASS RODS. Square. Cut to any length. For less than ½ ft. price is figured per inch.
Not less than 20c. of one size sold.

Size	Price per foot	Weight per foot		Price per inch
		lb.	oz.	
1/4 in. x 1/4 in.	$0.20	—	5	$0.03
3/8 in. x 3/8 in.	.30	—	11	.05
7/16 in. x 7/16 "	.40	—	14	.07

BRASS STRIP. (Ribbon.) Cut to any length. For less than ½ ft. the price is figured per sq. inch. **Not less than 20c. of one size sold.**

Thickness	Width	Price per foot	Weight per foot		Price per inch
			lb.	oz.	
1/64 inch	1 inch	$0.09	—	1	$0.01½
1/64 "	2 "	.16	—	2½	.02
1/32 "	1/2 "	.10	—	2	.02
1/16 "	1/4 "	.10	—	2	.02
1/16 "	1 "	.22	—	5	.03
1/16 "	2 "	.32	—	10	.05
1/8 "	5/8 "	.22	—	5	.04
1/4 "	1/2 "	32	—	10	.05

Fall River, Mass.

Dear Sirs:

I was **VERY WELL SATISFIED** with the last order and **EVERYTHING IS O. K.**

Yours sincerely,

ALEXANDER BURNS.

ALUMINUM.

ALUMINUM SHEETING. Cut to any size. For less than ½ sq. ft. price is figured per sq. inch. Comes in 12 in. widths.

Thickness	Price per sq. foot	Price per sq. inch	Weight per sq. foot	
			lb.	oz.
1/64 inch	$0.35	1/2c	—	6
1/32 "	0.55	2/3c	—	11
1/16 "	0.95	1c	1	5
1/8 "	1.95	1½c	2	10

Not less than 25 cents of one size sold.

COPPER.

COPPER SHEETING. Cut to any dimension. For less than ½ sq. ft. price is figured per sq. inch.

Thickness	Price per sq. foot	Weight per sq. foot		Price per sq. inch
		lb.	oz.	
No. 28	$0.46	—	11	$0.01
1/32 inch	0.76	1	13	.01
1/16 "	1.42	3	8	.02

Not less than 25 cents of one size sold.

[redacted]

COPPER RODS. Round. Cut to any length. For less than ½ ft. price is figured per inch.

Diameter	Price per foot	Weight per foot		Price per inch
		lb.	oz.	
1/8 inch	$0.07	—	1	$0.01
1/4 "	.16	—	4	.02
3/8 "	.26	—	9	.04
1/2 "	.47	1	—	.06

Not less than 20 cents of one size sold.

COPPER BAR. Used for switch board bus-bars, making knife switch blades, and other apparatus parts. Cut to any size. For less than ½ ft. the price is figured per inch.

Thickness	Width	Price per foot	Weight per foot		Price per inch
			lb.	oz.	
1/16 inch	1/2 inch	$0.10	—	3	$0.01
1/16 "	1 "	.20	—	5	.02
1/8 "	1/2 "	.35	—	5	.04
1/8 "	1 "	.80	—	11	.08

Not less than 20 cents of one size sold.

Dear Sirs: **Cleveland, Ohio.**

Received the package. EVERYTHING O. K.

Yours truly,

G. W. BURGESS.

PHOSPHOR BRONZE.

PHOSPHOR BRONZE STRIP, is well known for its springy qualities. It is used in all places where a spring strip is required, such as in detectors, tuning coil slides, mechanical movements, etc. The very best material for flat motor and dynamo brushes, and also for spark coil vibrators, etc.

Thickness B. & S. Gauge	Width	Price per foot	Weight per foot
No. 34	5/16 inch	$0.12	½ oz.
" 34	3/16 "	.10	½
" 28	1/8 "	.10	½
" 28	5/16 "	.12	¾

HARD RUBBER.

HARD RUBBER SHEETING. Used for all high grade electrical apparatus where perfect insulation or neatness is desired. Cut to any size. For less than ½ sq. ft., price is figured per sq. inch. 10 per cent. discount on sheets over 2 sq. ft. **Not less than 25c. of one size sold.**

Thickness	Price per sq. foot	Price per sq. inch	Weight per sq. foot	
			lb.	oz.
1/32 inch	$0.55	$0.00½	—	9
1/16 "	.90	.01	—	18
3/32 "	1.30	.01	1	11
1/8 "	1.55	.01¼	2	3
3/16 "	2.35	.02	2	5
1/4 "	2.95	.02¼	3	—
5/16 "	3.60	.02½	3	6
3/8 "	4.00	.03	4	7
7/16 "	4.90	.03½	4	8
1/2 "	5.60	.04	4	9
5/8 "	6.65	.04¾	5	—
3/4 "	7.75	.05½	7	—

HARD RUBBER TUBING. Used for insulating high tension current. Largely used in highest grade induction coils to insulate secondary from primary. Comes in 24" lengths. Cut to any size. For less than ½ ft. price is figured per inch. O.D.—Outside Diameter. I.D.—Inside Diameter.

O. D.	I. D.	Price per foot	Price per inch	
1/8 inch	1/16 inch	$0.12	$0.02	Not less than 20c. of one size sold.
3/16 "	1/8 "	.12	.02	
1/4 "	1/8 "	.20	.04	
1/4 "	3/32 "	.22	.04	
5/16 "	1/16 "	.25	.04	
7/16 "	3/16 "	.30	.05	
1/2 "	3/16 "	.40	.06	
5/8 "	3/16 "	.45	.07	
3/4 "	1/2 "	.50	.08	
1 1/4 "	1 "	.80	.12	

Philadelphia, Pa.

Dear Sirs:

Have just received the 5 ft. hard rubber tubing and FOUND SAME SATISFACTORY. Thanking you for YOUR ATTENTION in this matter, I remain,

Yours respectfully,

A. G. FIEDLER.

HARD RUBBER ROD. Comes in 24" lengths. Cut to any size. For less than ½ ft. price is figured per inch. Not less than 25 cents' worth sold on sizes thicker than ¼".

Diameter	Price per foot	Not less than 20c. of one size sold.	Price per inch
1/8 inch	$0.12		$0.02
1/4 "	.18		.03
1/2 "	.28		.05
3/4 "	.50		.08
1 "	.90		.15
1 1/2 "	1.75		.27
2 "	2.70		.65

FIBRE.

VULCANIZED FIBRE SHEETING. (BLACK AND RED.) Best grade fibre. Cut to any dimension. For less than ½ sq. ft., price is figured per sq. inch. 10 per cent. discount on sheets over 1½ sq. ft.

Thickness	Price per sq. foot	Price per sq. inch	Weight per sq. foot	
			lb.	oz.
1/64 inch	.30	.02	—	2
1/32 "	.40	.02	—	4
1/16 "	.50	.02	—	10
1/8 "	.70	.02	1	3
1/4 "	1.10	.02	2	4
3/8 "	1.70	.02	3	7
1/2 "	2.40	.04	4	8
5/8 "	3.20	.06	5	4
3/4 "	3.90	.08	6	3
7/8 "	4.70	.10	7	11
1 "	5.30	.10	8	14

Not less than 25c. of one size sold.

VULCANIZED FIBRE RODS. Cut to any length. For less than ½ ft. the price is figured per inch. Over 1½ ft. discount 10 per cent.

Diameter	Price per foot	Weight per foot		Price per inch
		lb.	oz.	
1/8 inch	0.54	—	¾	.12
1/4 "	.54	—	1¼	.12
3/8 "	.66	—	2	.14
1/2 "	.94	—	2½	.16
5/8 "	1.30	—	3½	.18
3/4 "	1.92	—	5¼	.30
7/8 "	2.50	—	6½	.44
1 "	3.00	—	9	.52

Torrington, Conn.

Dear Sirs:
I received your goods quite some time ago, and I am PERFECTLY SATISFIED WITH THEM. I intend to send another order later.
Yours truly,
KING J. BOGARDUS.

VULCANIZED FIBRE TUBING. Used largely for insulating primary from secondary in induction coils. Cut to any length. For less than ½ ft. price is figured per inch. Over 1½ ft. discount 10%. I.D.—Inside Diameter.

I. D.	Thickness of wall	Price per foot	Weight per foot.	Price per inch
			oz.	
1/8 inch	1/16 inch		4	.08
1/4 "	1/16 "	.60	4½	.04
1/4 "	1/8 "	.30	5	.08
3/8 "	1/16 "	.54	6	.06
3/8 "	1/8 "	.34	6	.10
1/2 "	1/16 "	.64	3	.06
1/2 "	1/8 "	.40	3	.10
5/8 "	1/16 "	.72	3	.06
5/8 "	1/8 "	.42	3	.10
3/4 "	1/16 "	.84	4	.06
3/4 "	1/8 "	.50	4	.12
7/8 "	1/8 "	1.00	4	.16
1 "	1/16 "	1.20	4	.14
1 "	1/8 "	1.00	5	.18
1 1/2 "	1/8 "	1.20	6	.30
2 "	1/8 "	1.72	9	.48
		2.10		

Not less than 15 cents of one size sold.

GERMAN SILVER.

GERMAN SILVER SHEETING. Employed wherever a flat spring is required. When rubbed with fine sand paper, the sheet obtains a bright silver lustre, making it a very valuable material for making detector parts, tuner parts, and other electrical apparatus parts. Can readily be cut to any dimension and shape with the common household scissors. We cut it any length and width. For less than ½ sq. ft. the price is figured per sq. inch. Discount 10% for orders of over 1½ sq. ft.

NOTE. This sheeting is only furnished in hard temper.

Thickness	Price per foot	Weight per sq. foot		Price per inch
		lb.	oz.	
No. 36	$0.30	—	5	$0.01
No. 30	.36	—	10	.01
No. 27	.50	—	15	.01
No. 24	.65	1	4	.01

Not less than 25 cents of one size sold.

ASBESTOS.

ASBESTOS SHEET. Cut to any dimensions. Size of sheets, 40x40 inches. Prices and postages are per ft. Not less than ½ sq. ft. sold. This material may be placed in a fire and **IT WILL NOT BURN.** Required by the National Board of Fire Underwriters, in connection with cutouts, panel, boxes, etc., wherever there is chance for a spark or flame.

Thickness	1-16"	⅛"
Price	$0.14	$0.26

Dear Sirs: **Malone, N. Y.**

I received order in FIRST CLASS CONDITION, and will favor you with other order in the future.

Yours truly. FRANCIS J. DUFFY.

6983 E.L.Co.

EMPIRE PRODUCTS.

EMPIRE CLOTH. Used throughout the country for insulating high tension transformers, insulation on motor and dynamo armatures and fields, and other electrical work. Has great mechanical strength. Will withstand 7,500 volts without puncturing.

Empire Cloth, per sq. yard No. 6983 .....$0.50

Can only be sold in pieces 3 ft. long; not less than ¼ ft. wide.

EMPIRE SILK.

This is one of the best insulators known. Despite of its being extremely thin, .002 inch, it withstands a puncture test of 2,000 volts, which is quite remarkable. It is used chiefly in spark coil work, transformers, condensers and everywhere where a good insulator must be used.

No. 6470 Empire silk (varnished silk), as described, per square yard..... $1.50

Not less than ¼ square yard sold.

BLACK EMPIRE CLOTH.

This is similar in quality to our No. 6983, but has a higher insulation value. It is used principally for spark coil and transformer work; also for high tension condensers. It withstands 10,000 volts without puncturing. Comes in one thickness only, .010 inch.

No. 6471 Black Empire cloth, as described, per square yard..... $0.60

Not less than ½ square yard sold.

EMPIRE VARNISHED BOND PAPER (TRANSPARENT).

This is a very useful article where extremely high insulation is not re-30 per cent. higher insulating strength. Puncture test, 1,500 volts per .0010 inch of small spark coils and transformers, *for spark coil condensers,* etc.

No. 6472 Empire varnished bond paper, per square yard..... $0.30

Not less than 1 square yard sold.

EMPIRE BLACK VARNISHED BOND PAPER.

This is similar to No. 6472 varnished bond paper, except that it has about 30 per cent. higher insulating strength. Puncture test, 1,500 volts per .010 inch thickness. It has also great mechanical strength and feels oily and smooth to the touch. It is used for spark coil condensers, core insulation, receiving condensers, etc. One thickness furnished, .010 inch.

No. 6473 Empire black varnished bond paper, per square yard..... $0.35

Not less than 1 square yard sold.

Gentlemen: Gelkirk, N. Y.

Received my first order of $1.00 from you. EVERYTHING WAS SATISFACTORY. Please send me particulars about your free "Wireless Course," as advertised in March American Boy.

Yours truly,

WALTER HEDRICKS.

EMPIRE PAPER. A cheaper substitute for "Empire Cloth." Will withstand as much voltage but does not possess such mechanical strength. Use this paper in building your coil or transformer and you won't be molested later by a "breakdown" from poor insulation. The paper is your GUARANTEE AGAINST TROUBLE. Excellent for making primary condensers.

Empire Paper, per sq. yard $0.20

Not less than 1 sq. ft. sold.

TIN FOILS.

TIN FOIL. We have different thicknesses of tin foil listed below. For small paper condensers we recommend our No. 1335. The different qualities listed are imported by us and are warranted to be of the best make. The No. 6251 is fairly thick and is suitable for small leyden jars and plate condensers. Our No. 6252 is intended for very heavy work, large capacity condensers up to 5 K. W.

Catalogue Number	Thicknesses	No. of Sq. Inches to Lb.	Remarks	Price per Lb.
4335	Thin	1728	Suitable for paper condensers	$0.25
6251	Medium	1200	For small leyden jars.	.20
6252	Heavy	600	For large transmitting condensers.	.35

PARAFFINE PAPER.

PARAFFINE PAPER. We carry the best grade of paper, especially manufactured for electrical condensers. This paper comes in three different thicknesses listed below. Guaranteed to be without flaws.

NO. 61. **OUR HEAVIEST GRADE.** This paper will withstand high voltage and may be used in any condenser subjected to same. This size is suitable as a primary condenser of a spark coil.

Price per sheet 24 in.x36 in. $0.06

NO. 92. **OUR MEDIUM GRADE...** This paper is used in manufacturing condensers for telephones, wireless outfits, and for all other purposes.

Price per sheet 24 in.x36 in. $0.05

NO. 014. **OUR THINNEST GRADE.** This paper is very thin and is used for condensers where an extremely high capacity is desired in a small space. Recommended for wireless telegraph, receiving set condensers.

Price per sheet 24 in.x36 in. $0.04

Highspire, Pa.

Gentlemen:

I received the wire, tinfoil, and receiver ALL RIGHT.

Yours respectfully,

ARTHUR E. POORMAN.

6984

NO. 6984 "ELECTRO" INSULATING COMPOUND. A Wax Compound specially prepared for filling transformer boxes, and insulating transformers. Melts at 220° F. and does not soften or crack in any weather.

	Price Post.
Insulating Compound, per lb.	**$0.10**
Insulating Compound, per 3½ lbs.	**0.30**

In quantities over 5 lbs., and over, **$0.7½** per lb.

INSULATING LIQUID COMPOUND. Necessary for all high grade and reliable work. Used in motor, dynamo, transformer, experimental and other work.

No. 6405 Micalac, ½ pint, Black.....$0.35

SHELLAC. An old friend of every experimenter and electrician. Used for insulating and painting electro-magnets, tuning coils, armatures, wooden work, and many other things. The orange shellac is used for electrical work, while the white shellac is used for finishing high grade polished wood work.

No. 6701 Orange shellac, Pint bottle $0.35

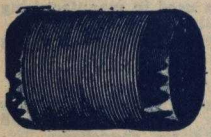
No. 6702 White shellac, Pint bottle ..... .35

6134

NO. 6134 SPECIAL RUBBER BAND. This rubber strip is ⅛ in. square and made of the best grade of Para rubber. It will stretch 7 times its normal length with ease, which is the essential point in model aeroplane band motors. We do not sell less than 5 ft. of this material.

Price per ft. **$0.06**

WIRES.



No. 22

BRASS WIRE. This wire is especially sold for making spiral springs. Sold on wooden spools which contain ½ lb. of wire. We do not sell less than ½ lb.

Size B. & S. Gauge	Price per Spool
No. 26	$0.40
" 22	.40
" 20	.40
" 18	.40
" 16	.30

Santa Maria, Cal.

Dear Sirs:

Received the German silver I ordered all O. K. I am PERFECTLY SATISFIED WITH YOUR DEALINGS. THE E. I. CO. CERTAINLY MAKES GOOD. Also received catalogue and Wireless Course literature.

Yours truly,

I. B. PARSON.

COPPER WIRE. Soft drawn. Used largely for winding tuning coils. ONLY SOLD IN 1 LB. SPOOLS.

Size	Price per one lb. spool
No. 14	$0.40
" 16	.40
" 18	.42
" 20	.44
" 22	.46

IRON.

IRON SHEET. Mostly used for making transformer cores. Comes in clean cut soft iron sheets 20 x 28 inches. ONLY SOLD IN FULL SHEETS AND ½ SHEETS.

Thickness	Price per sheet	Weight per sheet	
		lb.	oz.
No. 36	$0.19	1	—
No. 30	.21	2	6

ZINC RODS. Used in making spark gaps and battery zincs. For less than ½ ft. price is figured per inch. Over 1½ ft. lengths discount 10%.

Diameter	Price per foot	Weight	Price per inch
⅜ inch	.15	8 oz.	.02

STEEL PIANO WIRE. Used greatly for making various types of springs. This wire is characteristic for its tremendous strength and owing to this fact it is used in pianos wherein to obtain a high pitch note, the wire is stretched very tight. INVALUABLE ALSO FOR ARMATURE BINDING AND AEROPLANE WORK. NOT LESS THAN 25 FT. SOLD.

Prices Price is per 25 feet.

Diameter	No. 30	No. 26	No. 22	No. 20	No. 16
Price	$0.12	$0.14	$0.16	$0.16	$0.30

Millville, N. J.

Dear Sirs:

Please send me one of your latest catalogues. I HAVE SOME OF YOUR GOODS AND THEY PROVE SATISFACTORY.

Yours respectfully,

MR. LEON M. CAMPBELL.

PLATINUM WIRES.

(Prices subject to Fluctuations.)

No.		Per foot
1278	Platinum Wire .001 in. diameter	$0.50
1279	Platinum Wire .002 in. diameter	0.40
1280	Platinum Wire .004 in. diameter	0.38
1281	Platinum Wire .006 in. diameter	0.40
1282	Platinum Wire .008 in. diameter	0.60

By mail extra per foot, 2 cents
In less than 1 foot, 15 per cent. extra.
Not less than 6 inches sold

WOLLASTON WIRES.

This extraordinary thin platinum wire is used in all wireless stations in connection with electrolytic detectors. It is of such minute diameter that it can hardly be seen with the naked eye; this is especially the case with the smaller size.

No. 4313 Wollaston Wire 0.0005 inch diameter, price per inch 25c
No. 4314 Wollaston Wire 0.0001 inch diameter, price per inch 35c
By mail extra 2 cents

8002

LAMP CORD

No. 8002 Cotton Covered New Code Lamp Cord No. 18.
Price per foot .01½
No. 8005 Cotton Covered New Code Lamp Cord No. 16.
Price per foot .02

Weatherproof Rubber Covered Wires.

No. 8006 Single Braid Weatherproof Rubber Covered No. 14 Wire. Price per 100 ft. $1.60.
No. 8007 Double Braid Weatherproof Rubber Covered, No. 12 Wire. Price per 100 ft. $2.50.

Fixture Wire.

No. 7008 Rubber Covered Fixture Wire No. 16.
Price per 100 ft. $1.20

6272

PORCELAIN INSULATORS.

NO. 6272 SPLIT PORCELAIN KNOB. This split knob has met with immediate demand since its introduction, on account of the facility in stringing No. 14 Weatherproof Rubber-covered Wire for open work. Excellent for insulating the leads of an aerial from walls and other structures. Not less than six sold.

Price each, $0.02.

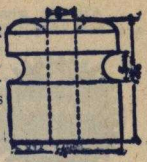
Dear Sirs: New Bedford, Mass.

I was very much pleased with the PROMPT DELIVERY of the Wollaston wire I purchased of you. IT SAVED ME QUITE A LITTLE TROUBLE. With the electrolytic detector I made, with your wire, Marconi's station at Wellsfleet, 56 MILES DISTANT; CAN BE HEARD with an aerial 50 feet in height.

Yours truly, BENJ. F. HOWE.

No. 6373 STANDARD PORCELAIN INSULATOR (SMALL). These insulators will be found entirely satisfactory for insulating receiving aerials in wireless telegraphy. By using a number of these in series an aerial for sending may be insulated and can be used on spark coils up to 4 inches. Not less than ½ doz. sold.

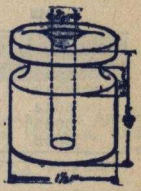
Price each **$0.02**



6373

No. 6373a STANDARD PORCELAIN INSULATORS (LARGE). This type is longer than No. 6273 and is intended for wiring. It will be found ideal for insulating the wireless transmitting set. Not less than ½ doz. sold.

Price each, $0.02.



6373a

PORCELAIN TUBES. These tubes are used in electrical wiring when passing wires through walls or floors. They are used as "leading-in" insulators in wireless stations and as such prove very efficient besides preventing fires and other fatalities which might occur from the high voltage sparks.

6277

⅜ INCH

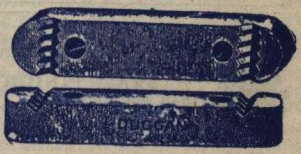
LENGTH	2 inch	3 inch	4 inch	6 inch	8 inch
Price each.....	**$0.05**	**$0.06**	**$0.07**	**$0.14**	**$0.25**
Catalogue No.....	6274	6275	6276	6277	6278

⅝ inch

LENGTH	2 inch	3 inch	4 inch	6 inch	8 inch
Price each.....	**$0.08**	**$0.09**	**$0.11**	**$0.20**	**$0.30**
Catalogue No.....	6279	6280	6281	6282	6283

NO. 6271 PORCELAIN CLEATS. These cleats may be used for various purposes aside from their regular uses. Many experimenters use them for insulating aerials and as such prove very satisfactory. We do not sell less than ½ doz. pairs.

Price per pair, $0.02.



6271

Auburn, N. Y.

Dear Sirs:

My order just came, and am VERY MUCH PLEASED WITH THE THINGS.

Yours truly,

EUGENE McCARTHY.

GEARS.

All the gears listed below are accurately cut and of brass. The gears are cut 32 pitch and therefore will run together.

6042

FINISHED BRASS SPUR GEARS.
Brass, 3/16 in. thick, 32 pitch.

Catalogue No.	Diameter	Teeth	Hole	Price Each
6042	3/8 inch	12	1/8 inch	**$0.15**
6043	1/2 "	16	3/16 "	**.18**
6044	3/4 "	24	3/16 "	**.22**
6045	1 "	32	1/4 "	**.30**
6046	1½ "	48	1/4 "	**.40**

6047

NO. 6047 SQUARE BRASS RACK. This rack may be used to fit any of the foregoing gears. The square size of this rack is ¼ in.

Price per inch .06

6048

NO. 6048 WORMS. To fit above gears 7-16 in. P. Dia. 3/16 in. hole. Brass.

Price Each $0.25

6050

NO. 6050 CROWN GEARS. To run with above gears.

Catalogue No.	Diameter	Teeth	Hole	Price
No. 6050	3/4 in.	24	3/16 in.	**$0.25**
" 6051	1 "	32	3/16 "	**.30**
" 6052	1½ "	48	3/16 "	**.40**

6145

BRASS PINION WIRE. To run with above gears. Not less than one inch sold.

Detroit, Mich.

Gentlemen:
Order No. 67,806 arrived yesterday. EVERYTHING O. K. Thanks very much.

Yours respectfully,
FLOYD L. MARSHAL.

BRASS PINION WIRE—Continued.

Catalogue No.	Teeth	Price per Foot
6145	8	$0.50
6146	10	.50
6147	12	.60
6148	14	.75

INDUCTION COIL CORE WIRE.

529

Many experimenters desiring to build their own coils are greatly hampered by being unable to obtain the genuine Norway Iron Core Wire.

This wire which we place on the market now is used in all our spark coils and transformer coils. It is directly imported from Norway, and guaranteed to be annealed twice. The size is No. 22 B and S. The wire is perfectly straight, machine-made and comes in the following lengths: 8, 10, 12, 14, 16, 18, 20, 22 and 24 inches.

If you need a high efficiency coil you cannot afford to do without this wire. Only sold by the pound.

No. 529 Induction Coil Core Wire, per lb. **$0.20**

DIMENSIONS AND WEIGHTS OF IRON WIRE CORES.

EXAMPLE. A core is desired 12 inches long, 1½ in diameter. Referring to table we find at the intersection the weight 4.50. (**This is not $4.50.**) Now multiply 4.50 lbs. with 20c. (price per lb.) and we have 4.50×20=90 cents, or total price of core.

Number of pounds per complete core in decimal fractions of pounds.

LENGTH IN INCHES	8	10	12	14	16	18	20	22	24
DIAMETER									
½ inch.....	.33	.41	.50	.58	.66	.75	.83	.....	.....
⅝ "	.52	.65	.78	.91	1.04	1.17	1.30	1.43	.....
¾ "	.75	.94	1.13	1.31	1.50	1.69	1.88	2.06	2.25
⅞ inch.....	1.02	1.28	1.52	1.79	2.04	2.30	2.55	2.81	3.07
1 "	1.33	1.67	2.00	2.33	2.67	3.00	3.33	3.67	4.00
1⅛ "	1.69	2.11	2.53	2.95	3.38	3.80	4.22	3.64	5.06
1¼ inch.....	2.08	2.60	3.13	3.65	4.17	4.69	5.21	5.73	6.25
1⅜ "	2.52	3.15	3.78	4.41	5.04	5.67	6.30	6.93	7.56
1½ "	3.00	3.75	4.50	5.25	6.00	6.75	7.50	8.25	9.00
1¾ inch.....	4.08	5.11	6.13	7.15	8.17	9.19	10.20	11.20	12.30
2 "	5.33	6.67	8.00	9.34	10.70	12.00	13.30	14.70	16.00
2¼ "	6.75	8.44	10.10	11.80	13.50	15.20	16.90	18.60	20.30
2½ inch.....	8.33	10.40	12.50	14.60	16.70	18.80	20.80	22.90	25.00
2¾ "	.....	12.60	15.10	17.60	20.20	22.70	25.20	27.70	30.30
3 "	.....	15.00	18.00	21.00	24.00	27.00	30.00	33.00	36.00

Prides Crossing, Mass.

Gentlemen:
I have received my order and EVERYTHING IS SATISFACTORY.
Respectfully,
HERBERT N. COLI.

PLATINUM IRIDIUM CONTACT POINTS.

6036

By a special welding process these contact points are made with the top of platinum iridium and shank of nickel. This nickel shank makes a net saving of 10 to 15% on the cost of each point were they made entirely of platinum.

Prices subject to change without notice.

No. 6036	Diameter of head	.100"
	Thickness of head	.0312"
	Diameter of shank	.054"
	Length of shank	.044"
Price, each, $0.30	Postage extra .02	
No. 6037	Diameter of head	.100"
	Thickness of head	.032"
	Diameter of shank	.062"
	Length of shank	.062"
Price, each, .50c	Postage, extra .02	
No. 6038	Diameter of head	.138"
	Thickness of head	.057"
	Diameter of shank	.063"
	Length of shank	.077"
Price, each, $0.95	Postage, extra .02	

Nos. 6036 and 6037 can be used on all vibrator springs up to 2" spark coils. No. 6037 is almost identical to No. 6036 but has a longer shank to go through thicker metal. No. 6038 may be used on vibrators up to 4" spark coils, and more if suitable condenser is used.

TELEPHONE MATERIAL.

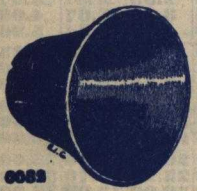
6080

No. 6080 CARBON GRAIN TRANSMITTER. This is a special design of transmitter for long distance work. It may be used with satisfaction on wireless telephone sets where a heavy current is to be passed through it. This is a first class instrument in many respects.

Each **$1.25**

NO. 6035 CARBON GRAIN TRANSMITTER. This transmitter will give perfect satisfaction on short telephone lines. It gives clear, perfect speech in the receiver.

Each **$0.95**



6082

NO. 6082 HARD RUBBER MOUTH-PIECE.
Standard size.
Each **$0.10**

Lonsdale Hill, Derry, England.

Dear Sirs:

I received the telephones last week in good order and find them VERY SENSITIVE. THEY ARE EXCELLENT with electrolytic detector for wireless.

Yours truly,

A. T. LEE.

NO. 6085 CARBON GRAINS FOR TRANSMITTER.
Small bottle $0.15

6085

TELEPHONE CORDS

8075

NO. 8075, 6 FOOT GREEN COTTON BIFURCATED CORD, with 6 nickel tips (see illustration).....Each, **$0.45**

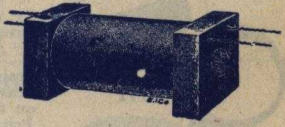
NO. 1309. 6 FOOT SILK BIFURCATED CORD, as used on our 1305 receivers, with two tips and 4 loop connections.....Each, **$0.55**
NO. 6666, cord is the same in all respects as the No. 1309. Price the same.

NO. 4003, 3 FOOT TELEPHONE CORD, with 4 metal tips, well finished throughout.
Each, **$0.15.**

4003

NO. 6083. RECEIVER DIAPHRAGM (Ferrotype).....Each, **$0.10**

NO. 6086 TELEPHONE COIL 50 OHMS.
Each **$0.50**
NO. 6087 TELEPHONE COIL 150 OHMS.
Each **$0.60**
NO. 6088 TELEPHONE COIL 250 OHMS.
Each **$0.70**



6086

NO. 6019 AUTOMATIC HOOK SWITCH. This forked hook switch is employed in all practical telephones. Any experimenter may have a first class telephone outfit by using this article.
Each **$0.25**

TEST CLIPS.

TESTING CLIPS. Employed for testing wires, cables, etc. by the wiremen of all the leading telephone and telegraph companies. No. 2521 and 2533 are equipped with steel pins so as to pierce the insulation on wire and obtain contact without skinning it. Splendid for helix clips.

3533

Michigan City, Ind.

Gentlemen:

The pony telephone receivers ordered from you came a short time ago. They have proved VERY SATISFACTORY, IN TELEPHONE AND WIRELESS WORK. Hoping to be able to favor you with another order in the near future, I am,

Yours respectfully,

W. C. FARGHER.

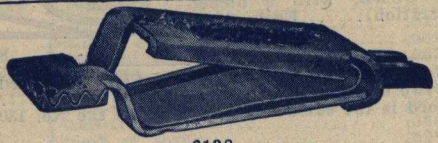
2521

No. 2521 Clip, each $0.18

2530

No. 3533 Clip, each 0.24

No. 2530 Clip, each 0.15



6138

NO. 6138 TESTING CLIP. This clip is heavily made of steel, with blued spring. It is made for heavy service and has a powerful grip. It is the most serviceable clip we handle. These clips are sherardized, which gives a soft gray satin finish, taking solder freely and preventing rust. It is an excellent clip for helices as it may be used on wires up to and including ½ in. in diameter.

Price each .19

HELIX OR TESTING CLIPS.

6112

NO. 6116 CLIP. A neat clip of steel heavily tinned.
Price each .03

NO. 6112 CLIP. This clip is of the same design as No. 6116 but is made of brass and heavily nickel plated. This is the neatest clip on the market at a very low price.
Price each .04

6114

NO. 6114 CLIP. A small jaw clip made of brass and nickel plated. May be used for holding crystals in detectors instead of cup and solder. Excellent for helices.
Price each, .04

6227

NO. 6227 CORD LUG. For use on cords to connect apparatus. Fits on P19 binding post.

Price per dozen .10

Wichita, Kan.

Dear Sirs:
I bought some goods from you, AND I AM PERFECTLY SATISFIED.

Yours respectfully,
MR. E. T. WELLS, JR.

NO. 6226 CORD LUG. Used largely in telephone apparatus work, so that wires may be disconnected from the binding post screws and tested independently.

Price per dozen .06

6226

NO. 6225 CORD TIPS. A neat tip for cords used in connecting apparatus.

Each .02

6225

ARMATURE DISCS. These discs are clean cut of soft iron and annealed carefully. They are used by us in our type "S" Dynamo as well as in other motors and dynamos.

6384

Catalogue No.	Outside Diam.	Dia. of Shaft Hole	No. of Slots	Thickness of Disc.	No. to 1 inch	Price per 100	Price per inch
6384	1 5/16 in.	3/16 in.	6	.018 in.	55	**$1.00**	.60
6385	2 1/16 "	7/16 "	12	.018 "	55	**1.30**	—
6386	2 1/2 "	9/16 "	12	.018 "	55	**1.50**	—
6387	3 "	5/8 "	16	.018 "	55	**2.00**	—
6388	4 "	3/4 "	20	018 "	55	**2.50**	—

ELECTRO MAGNETS.

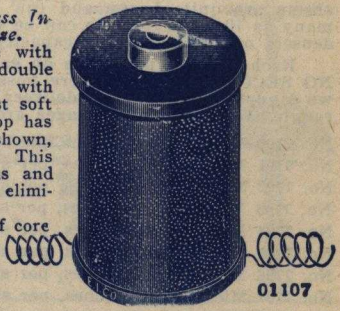
(Patented Dec. 20, '10.)

For Sounders Bells Relays and Wireless Instruments, etc. Illustration Full Size.

Our Electro Magnets are well made with fibre ends. Copper wire used being double cotton covered Magnets are covered with mottled paper. The core is of very best soft Norwegian iron, and each core at the top has a silver contact riveted into same as shown, which may be used for making contact. This is an important feature patented by us and serves to make a contact which of course eliminates another contact arm or standard.

Size over all 15-16 by 1 1-2; diameter of core 3-8 inches. Three styles carried in stock.

No. 01107 Electro Magnet, 20 ohms $0.22
No. 01108 Electro Magnet, 50 ohms .26
No. 01109 Electro Magnet, 75 ohms .30



01107

Guthrie Center, Ia.

Gentlemen:

In regard to order 59,102, will say I received the relay this afternoon IN VERY GOOD SHAPE.

Yours respectfully,

EARL KILGORE.

Selenium.

This peculiar substance is a conductor of electricity while exposed to light rays. An insulator in the lark. Used to make the well-known Selenium Cells (see article: "An Electric Sun Alarm," and "How to Make a Selenium Cell," May, 1908, issue **"MODERN ELECTRICS"**). Will close a relay when match is lighted near cell. See also article on "Television and the Telephot" in the December, 1909, issue.

Selenium will solve many problems during this century.

The only kind fit to use in the electrical arts comes in form of sticks. This is the kind we import.

9211 Selenium Metal in sticks, C. P., per ounce.....**$1.50**
One-quarter ounce (smallest quantity sold)..... .50

Tantalum Wire.

This fine wire is used mostly in the **"Tantalum Detector"** (see October. 1908 issue MODERN ELECTRICS). This makes an extremely sensitive detector. This wire, we believe, has some undiscovered possibilities. and the experimenter will do well to try it out in various ways. This wire is quite fine and does not break easily.

No. 9496 Tantalum wire, per inch..... **$0.10**
By mail, extra ..... .02

Mica.

We handle nothing but imported Mica, as the domestic kind is not good enough for electrical purposes.

For condensers Mica is acknowledged to be the best dielectric. Our sheets are quite heavy and can be safely split with a penknife. As many as 10 perfect sheets can be split from a single sheet to make condensers of an astonishing capacity.

Each sheet is packed in an envelope. We handle only first quality. NO SECONDS. If anywhere possible order Mica with other goods, as we cannot guarantee safe delivery through the mails, on account of the rough handling mail packages are subjected to.

No. 7700	Mica,	2x3 inches, per sheet	$0.03
No. 7701	Mica,	2½x4 inches, per sheet	.07
No. 7702	Mica,	3x5 inches, per sheet	.12
No. 7703	Mica,	4x5 inches, per sheet	.15
No. 7704	Mica,	4x6 inches, per sheet	.20
No. 7705	Mica,	5x7 inches, per sheet	.28
No. 7706	Mica,	6x10 inches, per sheet	1.00
No. 7707	Mica,	7x10 inches, per sheet	1.50
No. 7708	Mica.	8x10 inches per sheet	1.60

Gentlemen: Corinth, Miss.

I received THE GOODS O. K. TODAY, AND WAS WELL PLEASED WITH THEM. They WERE BETTER THAN I HAD EXPECTED FOR SUCH A PRICE. I will send you another order in about a week.

Yours for good service,

J. A. MITCHELL.

SWITCH PARTS.

NO. 6143 SWITCH POINTS. These points are the same as we use in manufacturing our battery switches. They are correctly designed so as to allow the contact lever to slide smoothly over them without sticking. Price includes one brass hexagon nut.

Price each .02 Price per dozen .20

6143

NO. 6129 SWITCH LEVER. This lever is identical to those which we use in our battery switches. The lever is of brass, heavily nickel plated, and properly made so as to insure good contact and smooth action.

Price each 0.08

6129

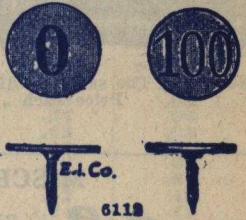
NO. 6021 LARGE SWITCH LEVER. This is a neatly made, nickel plated switch handle, 2½ in. long, ⅝ in. high. Composed of five parts with 2 nuts and washers.

Price each $0.12

6021

No. 6112 NUMERAL TACKS. Polished brass, numbers are stamped in black. We carry all numbers from 0 to 100. Cuts are full size.

Price each, $0.03. Price, per dozen, $0.30



6112

NO. 6114 SWITCH BUTTON TACKS. A handy switch contact point which may be placed on wood with little trouble or tools. Only a hammer is required.

¼"	Brass	Head.	Price,	per	dozen,	$0.12
⅜"	"	"	"	"	"	0.14
½"	"	"	"	"	"	0.16

6114

Dear Sirs: Willimansett, Mass.

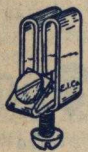
Received your shipment this morning. EVERYTHING WAS SATISFACTORY. The Rheostat regulator, which any fellow WOULD BE PROUD TO OWN, IS A DANDY. Thanking you for favors rendered. I remain,

Yours respectfully,

GEORGE W. CRAMER.

NO. 6020 SWITCH POINT TACKS. Nickel plated tacks for switch points. Nail ½ in. long, head 5/16 diam.
Each 1/4c.

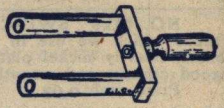
KNIFE SWITCH PARTS. Experimenters wishing to construct special switches and mount them on a board can find a complete list of parts listed here. The parts are from our Baby Knife Switches.



6700

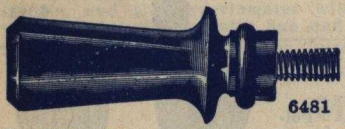
6701

6703



6704

No. 6700 Jaw Post and stop-binding and fastening screws. Each..... .05
No. 6701 Hinge post and stop-binding. Fastening hinge screw, nut and washer. Each ..... .05
No. 6702 Single Pole Blade, plain. Each ..... .04
No. 6703 Single Pole Blade Handle. Each ..... .07
No. 6704 Double Pole Blades riveted to fibre with handle, handle screw and nut. Each ..... .13

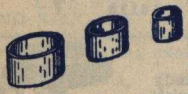


6481

NO. 6481 HARD RUBBER HANDLE. This handle may be used for a number of purposes besides a switch handle. It is of suitable size for handles on spark gaps up to 3 K. W. Cut actual size.
Price each, $0.10

No. 6482. The same handle but with 8/32 bushing instead of screw.
Price each $0.10

MISCELLANEOUS PARTS.



BRASS CUPS. We have listed below different sizes of accurate and neatly finished brass cups. These cups are designed to hold crystals for detectors, and are drawn in one piece.

6501-07

Catalogue No.	Inside Diameter	Price Each	Price per Doz.
6501	3/16 in.	——	$0.05
6502	1/4 "	——	.05
6503	5/16 "	——	.05
6504	3/8 "	——	.05
6505	1/2 "	.03	.30
6506	3/4 "	.04	.40
6507	1 "	.05	.60

Lanark, Ill.

Dear Sirs:
I received the apparatus in good condition. I AM SATISFIED WITH EVERYTHING.

Very truly yours,
G. M. WALES, JR.

BRASS BALLS. In compliance with the numerous demands we have received from our friends, we have acquired a full stock of brass balls. These balls are turned accurately and are guaranteed not to vary over 1-10,000 part of an inch. Used for spark gap balls, leyden jar parts, sliders, and other instrument parts. All these balls are SOLID BRASS.

Diameter	Price per dozen		Price each
1/8 inch.	$0.25	Prices subject to change without notice.	$0.03
3/16 "	.20		.02
1/4 "	.25		.03
3/8 "	.30		.03
1/2 "	.50		.05
5/8 "	.90		.08
3/4 "	2.50		.22
7/8 "	3.50		.30
1 "	5.50		.50
1 1/4 "	10.00		.90
1 1/2 "	19.00		1.65

MACHINE SCREWS

Round Head, Iron, only. Not less than one dozen of one size sold.

LENGTH	6.32 Thread Price per Gross	6.32 Thread Price per Dozen	8.32 Thread Price per Gross	8.32 Thread Price per Dozen
1/4 in.	$ .23	$ .03	$ .28	$ .03
3/8 "	.25	.03	.30	.03
1/2 "	.26	.03	.33	.04
5/8 "	.29	.03	.37	.04
3/4 "	.34	.04	.42	.05
7/8 "	.38	.04	.48	.05
1 "	.44	.05	.56	.06
1¼ "	.68	.07	.68	.07
1½ "	.....	.....	.92	.10
1⅞ "	.....	.....	1.24	.12
2 "	.....	.....	1.32	.14
2¼ "	.....	.....	1.60	.18
2½ "	.....	.....	1.88	.20
3 "	.....	.....	2.60	.27

NO. 6032 COMBINATION SCREW.

We are pleased to present to the experimenter a new type of screw, which is a wood screw on one end and machine screw on the other end. This may be used in many combinations, but the greatest use will be for changing standard binding posts, and save the expense of purchasing new posts. Comes only for 8-32.

Price 3 for 5c.

Everett, Mass.

Gentlemen:

I received your goods IN A SATISFACTORY MANNER. Thanking you for same, I remain,

Your customer,

NORMAN C. PARSON.

6968

NO. 6968 BRASS CUP. This brass cup is of suitable size to fit our Carbon Cup No. 6027. 8/32 screw, 5/16 in. long, diameter 11/16 in., ¼ in. high. May be used in certain detectors where our detector brass cups cannot be used.

Price each $0.08 Price each, silver plated, $0.10

6014

NO. 6014 BRASS PIECE. This part is mostly used for constructing detectors for wireless telegraphy. It may be used for many purposes. Nickel-plated, knurled disk ½ in. dia., ⅛ in. thick, shank 1¼ in. long, ¼ in. threaded to take 8/32 nut.

Price each $0.08

ROTARY SLIDING DETECTOR CUPS.

(Patents Pending.)

7779

7780

These new cups are now used exclusively on our No. 7777 as well as on our No. 9500 Detectors. They have made the greatest hit of anything we have put out recently. The ¾-inch brass cup is equipped with solid, knurled fibre ring, while the bottom of the cup has a stud which fits with friction in the phosphor bronze slide. The cup can therefore be rotated as well as moved back and forward. The slide has a ½-inch 8/32 screw at the bottom to fasten it to detector. Cup and slide are nickel plated and polished.

No. 7779. Rotating sliding cup with slide (no crystals) .....Each $0.30

No. 7780. Rotating sliding cup without slide (no crystals) .....Each 0.25

6017

NO. 6017 BRASS STAND. This brass stand may be used for numberless purposes. It is highly polished, and takes a 10/32 screw at bottom. Size 3¼ in. x ¾ in.

Price each $0.20

6024

NO. 6024 BRASS WASHER OR PILLAR. Nickel plated round brass piece. ⅜ in. x ½ in. Hole to let 8/32 screw pass.

Price each $0.08

New York City.

Gentlemen:

The "TELIMCO" OUTFIT ARRIVED SAFELY. After setting it up according to directions, I found it to GIVE ENTIRE SATISFACTION. I consider it is worth a GREAT DEAL MORE MONEY THAN I PAID FOR IT, AND WOULD NOT PART WITH IT FOR TWICE THE AMOUNT WHICH I PAID FOR THE INSTRUMENTS.

Yours truly,

WM. E. STILES, M.D.

NO. 6027 CARBON CUP. Small size. Carbon Cup for detector. 5/8 in. x 3/8 in.

Price each $0.15

6027

TYPEWRITER KNOB.

While our Thumb Screw No. 6011 has been found very useful in the construction of many instruments, we have had a persistent demand for a larger handle which had a sleeve with a convenient hole and tightening screw. We are pleased to meet this demand with the special handle illustrated in the cut. It may be used for a great variety of purposes, such as variable condenser handles, variometer handles, spark gap handles, rotary switch or rheostat handles, and other uses. The dimensions are: Diameter of knurled head, 1½ in.; length of sleeve, about 7/16 in.; diameter of sleeve, 3/18 in.; diameter of hole in sleeve, ¼ in. A 6-32 screw holds the metal rod in place when in the hole of the sleeve. Shank is nickel plated.

No. 6013 Typewriter Knob $0.20

6013

NO. 6011 HARD RUBBER THUMB SCREW. This Thumb Screw is useful for constructing many kinds of instruments. It is a favorite with wireless experimenters who use this part in their detectors. Equipped with brass screw 7/8 in. long. Thread 8-32. Diameter of head 1 in.

Price each, $0.15

6011

NO. 5555 BRASS CAP NUT. Cut full size. This handy nut comes in one size only, namely for 8/32 thread. It is used to finish up an instrument, where an ordinary brass nut or screw head would look unsightly or where it is impossible to use a screw head.

Price, each, 1½c.

Price, per dozen, 15c.

5555

NO. 6031 THREADED BRASS ROD. Two sizes 6-32 and 8-32. Handy in constructing apparatus.

Price per foot $0.25

6031

NO. 5025 HARD RUBBER PILLAR. Hard Rubber, polished, 2⅛ in. x 5/8 in., hole 3/16 in. diameter.

Price each $0.10

5025

BRASS NUTS. We carry two sizes in stock but can supply other sizes on orders.

6-32 Thread Nuts..... 10c. per doz.

8-32 Thread Nuts..... 10c. per doz.

6-32

New York City.

Dear Sirs:

Let me say I AM WELL PLEASED with the ONE-INCH BULL DOG SPARK COIL I purchased of you a short time ago. I have gotten 1¼ INCH OUT OF IT without affecting the coil. I intend to place another order with you in the near future.

Yours truly. W. WASHBURN.

6015

NO. 6015 HEAVY BRASS WASHER. This Washer is ½ in. dia., 3/16 in. thick, hole passes 8/32 in. screw.
Price each $0.03

6030

NO. 6030 WASHERS. Washers for 6-32 and 8-32 screw. ⅜ in. dia.

Price 10 for 5c.

BAMBOO.

BAMBOO STRIPS. We carry a stock of selected bamboo, especially intended for Aeronautical construction.

MODEL AEROPLANE STOCK.
Bamboo 32 in. long per ¼ in. in dia. Price per length .06
GLIDER AND AEROPLANE STOCK. Excellent for wireless telegraph aerial spreaders.

Length	Dia. at the Butt	Remarks	Price Each
8 ft.	1 in to 1¼ in.	Tapering about 1/32 in. per ft.	$0.30
8 ft.	½ in. to ⅝ in.	Tapering slightly	.25
8 ft.	1¼ in. to 1½ in.	Tapering slightly	.50

MUST BE SENT BY EXPRESS unless cut in 12 in. pieces.

We can supply other sizes up to 20 ft. long and will be pleased to answer information and prices on these.

6613

NO. 6613 BRASS PULLEY. ½". A neat brass pulley which can be screwed into wood. Useful in many mechanical experiments, to raise headphones, etc.

Price, each $0.08

1339

GLASS SPIRIT LAMPS.

NO. 1339 Invaluable to the experimenter. Used in thousand different ways, to bend glass rods and tubing, to solder wires, etc. Uses wood alcohol. As per cut, each $0.25

Dear Sirs: Salem, Ore.

I received the coils in first class condition two days ago. THEY ARE THE BEST I HAVE EVER HANDLED, AND I HAVE USED A GREAT MANY MAKES. THEY GIVE MORE THAN THE GIVEN SPARK LENGTH. You may use my name as a testimonial if you wish. Yours respectfully, K. PENNELAKEE.

The American Visible Typewriter.

A Great Innovation in the Typewriter and Educational World.

IDEAL FOR HOME USE OR A SMALL BUSINESS CORRESPONDENCE

6511

For over twenty years the manufacturers of this machine have been manufacturing strictly high-grade, durable, low-priced typewriters, and this typewriter represents the results of these years of experience. The American Visible Typewriter stands to-day absolutely alone in this field. The Ideal Home Typewriter.

Important Points of the American Visible Typewriter:

1st—All the writing is visible.

2d—It will handle a small private or business correspondence.

3d—So simple in construction that a child can operate it without an instructor. Full directions with each machine.

4th—Finish—handsome black enamel with gold lettering, base-board mahogany finished.

5th—Portability—Weighs 2 lbs. Furnished in Leatheroid case, 6 x 10 x 3.

6th—Inking is automatic.

7th—Paper feed, line spacing, letter and word spacing is like the high-priced machines. Takes paper 9½ inches wide. Will do everything but meet the requirements of a heavy correspondence.

8th—Teaches young people business and commercial forms. Is of great assistance in school work—makes it interesting and attractive.

9th—The letters are arranged like the standard keyboard machines. Saves much of the time required at Business College in learning the use of high-priced machines.

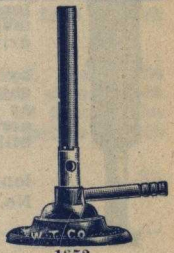
10th—This machine may be exchanged at any time within a year for the American $50 Typewriter at special price of $30.

No. 6500 American Visible Typewriter, as described. Price complete with leatheroid case **$4.90**

Bunsen Burners.

Brass on iron base, with Stop to regulate the admixture of air. The brass tip inside of tube can be so adjusted to regulate the flow of gas. To be used with ordinary illuminating gas. Intense heat.

No. 1352 Bunsen Burner as per cut..... **$0.50**



1352

Maysville, Ky.

Dear Sirs:
I received my instruments and AM WELL PLEASED WITH THEM.
Yours truly,

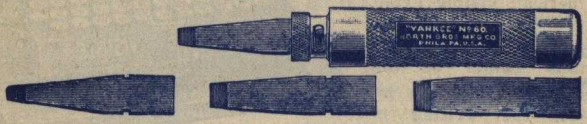
ASHBY BURGOYNE.

In the following pages we present the selectest line of high grade tools in the U. S.

We had many attractive offers from makers manufacturing cheap tools, but refused to list same for good reasons. We have a great many workmen in our own shops, and know from experience that cheap tools are the most expensive ones to buy. They exasperate you, go on your nerves and turn out a "bum job."

All our tools are of highest grade, and we shall immediately exchange any not being all we claim for them, or defective.

"Yankee" Magazine Pocket Screw Driver



No. 60

The need and usefulness of this tool will be instantly recognized. There is nothing just like it or that can be compared with it in the market to-day. It is made with four detachable blades of varying widths and thicknesses to suit different size screws.

The blades are kept in magazine formed by handle. The tool is small and convenient to carry in the pocket, measuring when closed only 3 inches long and ⅝ inch in diameter, and weighing only two ounces. Four blades furnished.

It is made of steel, handsomely polished and nickel-plated.

No. 60 "Yankee" magazine pocket screw driver.....$0.55

No. 12

"Yankee" Ratchet Screw Driver

This tool has a blade which is only 1¼ inches long, and is made for special use of electricians and mechanics requiring a strong, substantial screw driver with a short stub blade.

The adjustment for right and left hand is made by pushing the shifter to opposite ends of slot; when shifter is placed midway in slot the blade is held rigid as in ordinary screw driver. The adjustment being across instead of in line with blade, avoids any possibility of changing shifter while in use.

Blade 5-16 inch diameter, 1¼ inches long, entire length of screw driver, 5¾ inches.

No. 12 "Yankee" Ratchet screw driver, each....$0.50

Milbridge, Me.

Dear Sirs:

The half-inch coil I bought of you IS WORKING FINE. I can get a THREE-QUARTER INCH SPARK without affecting the coil.

Yours truly,

CARROLL D. BRAY.

"Yankee" Spiral-Ratchet Screw Driver

No. 35

Right and Left Hand, and Rigid

It is intended for electrical workers, cabinet makers, carpenters and mechanics having a large number of small screws to drive.

It is small enough to be conveniently carried in the pocket, measuring 7 inches long when closed (without bit) and weighing complete less than 7 ounces.

The bits are straight, so they can be used to drive screws through holes in insulators, etc., where the flattened blades will not pass through holes. Extra long bits can be supplied for this tool.

No. 35 "Yankee" Spiral-Ratchet screw driver.....$1.05

"Yankee" Automatic Drill

No. 41

One of the most ingenious and the most serviceable tool on the market.

Made of steel and brass nickel plated and buffed. Has eight drill points 1-16 to 11-64 inches, which are in plain sight when magazine is open. During the return movement of handle the drill point revolves backward to clear chips, etc. Entire length of tool, inclusive of drill point, 11⅝ inches.

No. 41 "Yankee" Automatic Drill, each.....$1.35

Penn Yan, N. Y.

Dear Sirs:

Received your information that I asked of you and thank you a thousand times for the same. I would not take $10.00 FOR THE COIL I RECEIVED OF YOU AT $4.50. IT WILL JUMP AN INCH ON FOUR COLUMBIA DRY CELLS.

Yours respectfully,

CHAS. CAREY.

"YANKEE" RATCHET SCREW DRIVER.

6791

The ideal screw driver. Perfect in every way.

No. 6790	2 in. blade,	each,	$0.30
No. 6791	3 in. blade,	each,	0.40
No. 6792	6 in. blade,	each,	0.60

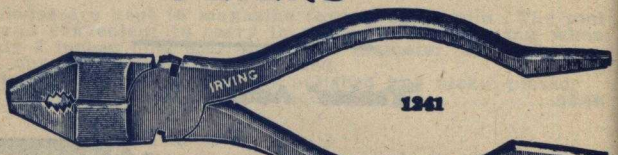
"IRVING" SCREW DRIVER.

Equipped with non-twisting blade, and handle is grooved for obtaining firm grip.

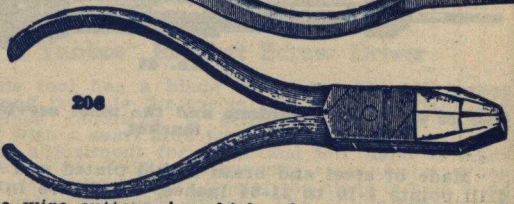
6795

No. 6793	2 in. blade	each,	0.16
No. 6794	4 in. blade	each,	0.18
No. 6795	6 in. blade	each,	0.22
No. 6796	8 in. blade	each,	0.26

PLIERS



1241



206

These Pliers, despite the low price, are of the very best material and fully guaranteed. They are all imported by us and cannot be matched for the money.

They have side wire cutters, in which wires up to No. 8 can be cut.

Screw driver at one end is provided. Side cutters, etc. Highest finish.

						Each.
No. 206	Imported plier,	5	in.	long,		$0.25
No. 206	" "	6	"	"	fully polished	.30
No. 1241	" "	6	"	"	" "	.33
No. 1285	" "	6	"	"	nickel plated	.40

Champaign, Ill.

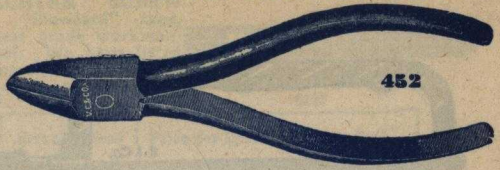
Dear Sirs:

Received my order and am VERY MUCH PLEASED WITH YOUR SERVICE AND THE RHEOSTAT IS A "DANDY." THE LIGHTS ARE THE SAME.

P. WARDER.

These nippers are fully guaranteed. They are imported by us and are the very best value in the country. They are all made of Cast Steel and are exceedingly powerful. This Nipper is furnished in black, bright face.

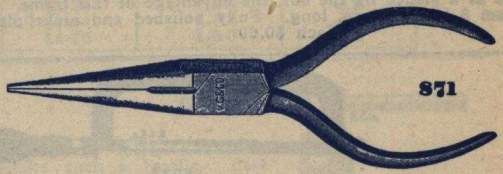
SIDE CUTTING NIPPERS LAP JOINT.



No. 452 Nipper, 5 inches long..... $0.48

This plier is used a great deal in Electrical Work, and will be found a handy addition in any work shop. The nose measured from the joint is 1½ inches long. It is useful for small work, etc. One size only, 5 inches long.

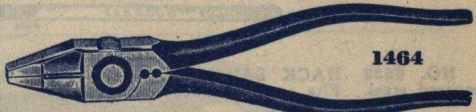
LONG SHARP NOSE SIDE CUTTING PLIER.



Black body, polished jaws.
No. 871 Sharp Nose Cutting Pliers, as described, each..... $0.38

This is the best plier we make and it the best one that money can buy. It is very powerful and is guaranteed in all respects. This is not a toy but is a plier which usually sells at a much higher price in the trade. It is made of best Krupp steel.

SIDE CUTTING PLIER, CAST STEEL.



No. 1464 Plier, as described, 6 inches long, each..... $0.50

SIDE CUTTING PLIER, CAST STEEL, INSULATED.

This is the same plier as our No. 1464 except that the handles are insulated with hard rubber. This is one of the most beautiful and valuable pliers made, and will protect any one from a shock even when working on a high tension line. The hard rubber insulation is about 1-32 inch thick. Hard rubber is highly polished, jaws nickel plated. An up-to-date plier in all respects.

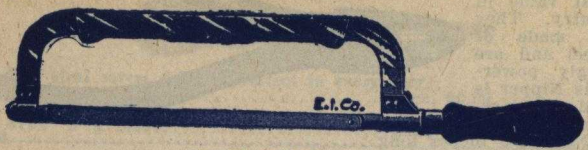
No. 1470 Insulated Plier, as described, 6 inches long..... $1.25
No. 1471 Insulated Plier, as described, 8 inches long..... 1.50

Dear Sirs: Newport, R. I.

Please send me your latest catalogue. The one-inch coil that I got from you some time ago IS THE BEST COIL I HAVE EVER SEEN FOR WIRELESS USE.

Yours truly,

ESQUIN WALKER.



6221

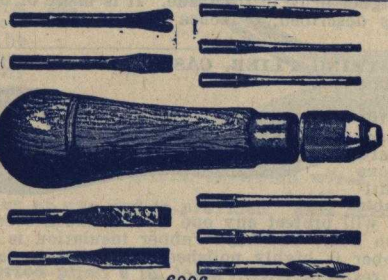
NO. 6221 ADJUSTABLE HACK SAW FRAME. Everyone can readily see at a glance by the cut, the advantage of this frame. It takes all blades from 8 in. to 12 in. long. Fully polished and nickel-plated.
Each $0.60

6231

NO. 6231 JAPANNED SOLID HACK SAW FRAME. A neat non-adjustable frame. Convenient size for the experimenter. Takes 8 in. blades.
Each $0.20

6232

NO. 6232 HACK SAW BLADE. 8 IN. LONG. Best quality of tempered steel. Fits our No. 6221 and 6231.
Each .06



6006

NO. 6006 HOLLOW HANDLE TOOL SETS. A high grade assortment of 10 tools required in every household, shop, laboratory or office. Applewood handle.
Each $0.40

Dear Sirs:

San Jose, Cal.

I bought some wireless goods a couple of years ago AND WAS **WELL PLEASED WITH THEM.**

Yours truly, **CECIL MILLS.**

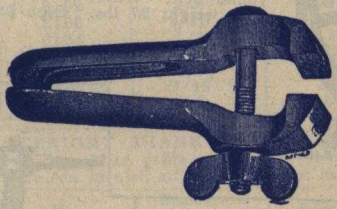
NO. 6191-97 MACHINE SCREW TAPS. We handle "Standard" taps, which are of the highest grade workmanship and tempered steel. We have listed below only the sizes mostly used, but can quote prices on other sizes on application.

6197

No.	Size of Thread	Price per Dozen	Price Each
6191	2-56	$1.35	$0.12
6192	4-36	1.35	.12
6193	6-32	1.35	.12
6194	8-32	1.35	.12
6195	10-24	1.35	.12
6196	12-24	1.35	.12
6197	14-20	1.50	.13

6088

NO. 6088 TOOL OR TAP HOLDER. For holding tools which require such a handle. Best machine work possible is demonstrated in this tool.
Each $0.55



6086

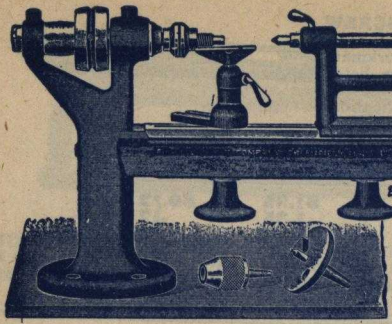
NO. 6086 HAND VISE. Neat useful little hand vise. A handy tool around the shop.
Each $0.31

COLD CHISELS. A good grade of hardened steel used in these chisels.
No. 6950 Each ½ in. face, $0.10
No. 6951 Each, ¾ in. face, 0.20

6950

Fort Fairfield, Me.

Gentlemen:
I received the taps and dies IN PERFECT ORDER. THEY ALL WORK SATISFACTORILY.
Yours respectfully,
P. CHURCHILL.



6029

NO. 6029 PONY LATHE. We beg to present to our many friends our very latest novelty, this small, yet perfect lathe. Though this machine will not do the work of those costing $200 and more, we do claim that it can turn small wood, brass, rubber, fibre and other material articles with satisfactory tools. This lathe is furnished complete with Tail Stock, Tee Rest, Face Plate, Saw Arbor, and Three Jawed Chuck, capacity 0 to 5/32 in. The bed is 12 in. long; it swings 5 in. and is 3½ in. extreme distance between centers. Pulley is both for flat belt ¾ in. wide or round belt ¼ in. dia. May be run on our "Hercules" water motor, our type "S" Dynamo, or our foot power. With the electric motor an ideal outfit is secured and no experimenter can call his laboratory complete without it.

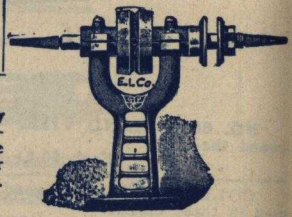
Each $7.25 Shipping weight 18 lbs.

6016

NO. 6016 FOOT POWER. Another of our novelties. For turning our lathes or dynamos it will be found perfectly satisfactory. Will take round belt. Wheel is 16¼ in. diameter. Shipping weight 27 lbs. Each $3.25.

NO. 6021 POLISHING HEAD. May be used for holding a buffing wheel, grindstone or other wheels. Has a solid iron frame 6 in. in height; Steel spindle ⅜ in. diameter and 8 in. long. Pulley takes flat or ¼ in. round belt.

Each $1.45



6021

Watseka, Ill.

Dear Sirs:

I received ½-inch Spark Coil. I TESTED IT AND FIND IT O. K. It is just AS IT WAS REPRESENTED IN CATALOGUE. My future orders will be yours.

Sincerely yours,

CHAS. FRANCIS DAY.

DRILL TABLE.

Below we have compiled a table showing the size drill required to tap a hole to fit a certain size screw, and also to drill a hole which will allow a screw to slip through.

Tap	Tap Drill	Slip Drill
2-56	No. 49	No. 43
4-36	No. 44	No. 34
6-32	No. 37	No. 28
8-32	No. 30	No. 19
10-24	No. 26	No. 11
12-24	No. 19	No. 2
14-20	No. 15	9/32

If, for instance, an experimenter wishes to place a 2-56 machine screw into a metal sheet, he drills a hole with a No. 49 drill as per above table, and then taps the hole. Now, if he wishes to have a hole through which a 6-32 screw will slip through readily, he looks at the above chart and under slip drills and opposite 6-32, he will find the size drill to use, being in this case No. 28. This table will be appreciated by the experimenter who has machine work to do.

6163

BIT STOCK DRILLS. We handle the "Standard" drill which is universally known for its quality. It will outlast all the other cheap drills, and will be found the cheapest drill in the end. This drill is designed to be used in braces.

No.	Diameter	Price Each
6161	1/16 in.	$0.07
6162	1/8 "	.09
6163	3/16 "	.14
6164	1/4 "	.18
6165	5/16 "	.21
6166	3/8 "	.28
6167	7/16 "	.35
6168	1/2 "	.38

STRAIGHT SHANK TWIST DRILLS.

Same quality as our other drills. These drills are listed in fractional parts of an inch. We can furnish any size drill not listed below.

No.	Diameter in Inches	Price Each
6151	1/16 in.	$0.06
6152	1/8 "	.08
6153	3/16 "	.10
6154	1/4 "	.14
6155	5/16 "	.19
6156	3/8 "	.24
6157	1/2 "	.34

Galveston, Texas.

Dear Sirs:
I have found that my Telimco No. 2 set WILL WORK 250 FT. WITHOUT GROUND OR AERIAL. Please send printed matter on the Static Machine and Electrolytic Detector.
Yours truly,

KING VIDOR.

STRAIGHT SHANK TWIST DRILLS. Below we have a list of twist drills of the most convenient sizes. We carry a full stock of these drills and can furnish any other size not listed. These are "Standard" drills and are made of the highest grade of steel. Listed according to the Stubs' Steel Wire Gauge.

No.	No. by Gauge	Decimal Equivalant	Price Each
6170	2	.2210	$0.12
6171	4	.2190	.12
6172	6	.2040	.11
6173	8	.1990	.11
6174	11	.1910	.11
6175	15	.1800	.11
6176	19	.1660	.10
6177	22	.1570	.10
6178	26	.1470	.10
6179	28	.1405	.09
6180	30	.1285	.09
6181	34	.1110	.08
6182	37	.1040	.08
6183	40	.0980	.07
6184	43	.0890	.06
6185	44	.0860	.06
6186	49	.0730	.05
6187	52	.0635	.05
6188	55	.0520	.05
6189	58	.0420	.05

6422

ADJUSTABLE ROUND DIES. Outside diameter 5/8 in., thickness 1/4 in. Used in our die holder No. 6007. This die will cut clean, accurate V threads.

Catalogue No.	Size of Thread	Price Each
6422	2-56	$0.30
6423	4-36	.30
6424	6-32	.30
6425	8-32	.30
6426	10-24	.30
6427	12-24	.30
6428	14-20	.30

6007

NO. 6007 DIE HOLDER. Will fit any 1/4 in. diameter die which we carry in stock. This is the finest stock for the price on the market. The handles are knurled to insure firm hand grip.
Price each $0.40

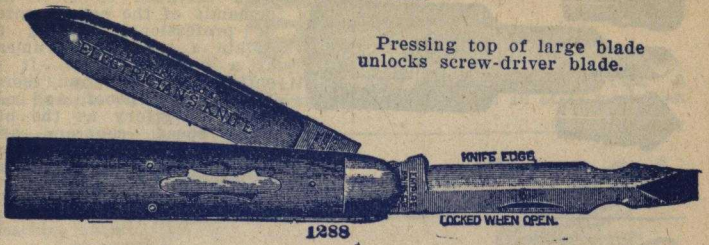
Dear Sirs: **Parsons, Kan.**

A few days ago I received my receiver from you, AND FIND IT IN GOOD ORDER. IT IS AS REPRESENTED, and I feel sure I have received A FAIR AND SQUARE DEAL and you may find that there will be more orders from me.

Yours truly,

C. E. McDONALD.

ELECTRICIAN'S KNIVES.



Pressing top of large blade unlocks screw-driver blade.

1288

No. 1227. Electrician's Knife, each.....65c
No. 1288. Electrician's Knife with blade, each.....85c

NO. 6023 BENCH DRILL PRESS. The drill press illustrated herewith is of very simple construction to meet the demands for a moderate priced, yet effective drill. It is designed to be used in connection with our hand drills as shown in the illustration. This gives one the advantage of possessing a hand drill and a drill press in one tool and at a reasonable price. The frame is made of steel and iron, Japanned. Weight 7½ lbs.

No. 6022 Price of frame only $2.25

No. 6023 Price of frame complete with hand drill as illustrated $3.35

No. 6949 HAND DRILL has a brass, white, nickel handle.

Frame malleable iron, well japanned.

Gears—Cut Teeth, Nickel Plated.

Guard—Both gears are held together by a steel Guard, having every advantage of a double Geared Drill.

Chuck — Three-jawed; capacity 0-5/32". It has knurled Nut, nickel plated, and is well made and accurate. Will hold any twist drill from 5/32" to No. 80.

No Drill Points furnished with this tool.

Price each $1.25

6023

6949

No. 6981 HAND DRILL. Black enameled, cast iron frame and gears. Steel spindle. We furnish free six drill points, which are supplied in a wooden box. Length, 8 inches.

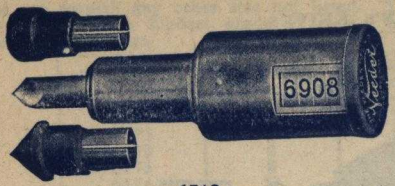
Price each .....$ .60

6981

Dear Sirs: Jacksonville, Fla.

I received the 1-inch Spark Coil, O.K. and AM MUCH PLEASED WITH IT. IT SENDS BETTER THAN THE TWO-INCH COIL I HAD.

Yours truly, ELMER PERE.

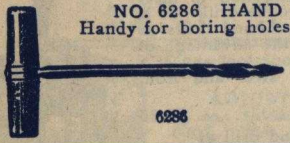


6513

NO. 6513 SPEED COUNTER. This instrument has been designed to meet the demands of the experimenter or professional wishing to obtain a reliable instrument at a moderate cost. It is entirely enclosed, and therefore is dust proof, and not liable to injury as the old type speed counters are, wherein the gearing is exposed. Equipped with ball bearing. An extra rubber tip is furnished with the instrument.
Price each **$1.15**

6009

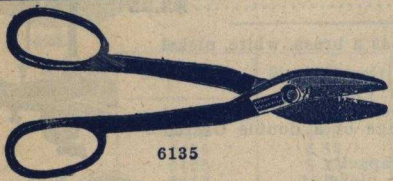
NO. 6009 GLASS TUBE CUTTER This is an instrument with which glass tubes may be cut accurately to any length desired. It cuts the tubes smoothly and don't break the glass. The tool is nickel-plated and full directions given with each.
Price each **$0.25**



6286

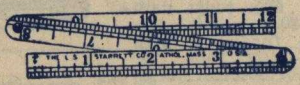
NO. 6286 HAND GIMLET. Three sizes ⅛ in., 3/16 in., ¼ in Handy for boring holes for binding posts, passing wires, etc.

Each **$0.10**



6135

NO. 6135 TINNER'S SNIPS. 9in. Heavy cast steel shears, best make, for cutting metal sheets.
Each, $0.35
No. 6982, same but solid steel, 8 in., each **$0.90**



6041

NO. 6041 FOLDING STEEL POCKET RULE.—More accurate and neater than the old wooden type. Ruler is one foot long. Furnished in a leather case.

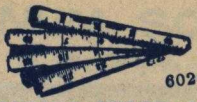
Each, $0.15

Pontiac, Mich.

Gentlemen:

I have several articles from your firm now, AND ALL ARE OF THE BEST. I HAVE SUCCEEDED IN SELLING OR RATHER PURSUADING FOUR OTHERS TO BUY OF YOU. I bought a Type S. Dynamo OVER A YEAR AGO, AND IT IS IN PERFECT CONDITION NOW; BESIDES IT GETS LOTS OF WEAR, I CAN TELL YOU.

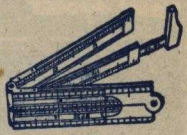
Yours truly, GLENN BOLTON.



6026

NO. 6026 ZIGZAG FOLDING RULER, 5 ft. long. Brass Tips. A great favorite with carpenters, electricians, plumbers, and all other mechanics.
Each, $0.35

NO. 6220 CALIPER RULE. Used for measuring thicknesses and diameters of rods, sheets, etc. A boon to persons handling boards, rods, metal sheets or machine work.
Each .24



6220

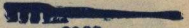
6224

NO. 6224 CENTRE PUNCH. A good centre punch is a prime necessity for accurate work. This punch is hammer forged, made of best crucible steel, with sharp point. The finest tool for the price, and far superior to the cheap cast iron punches generally sold.
Each $0.12

NO. 6021 WHEEL GLASS CUTTER. Furnished in red enamel finish. Very sharp.
Each $0.06

6021

No. 6988 Rosewood handle, $0.12



6988

THE EXPERI-

This is a new and very useful article. As far as the electrical worker goes, its name does not do it justice. It is an excellent article to stop up holes in marble, porcelain and glass bases and it is far better than wax, as it is water and fireproof. No heat required, simply mix powder with water and in a few hours you have a porcelain substance hard as stone, which is a **fine insulator**, acid and fireproof. When set it becomes, in effect porcelain.

MENTER'S FRIEND

SMALL PORCELAIN-LIKE CASTINGS, BASES, TUBES, ETC., CAN BE MADE BY THIS SIMPLE PROCESS WITHOUT COSTLY MOULDS OR DIES.

Will mend anything—porcelain, glass, china, wood, or metal; indispensable in the laboratory.

No. **3333.** "Potmend," small can..... **$0.15**

No. **3334.** "Potmend," large story can..... **$1.00**

Dear Sirs: **Tecumseh, Neb.**
Your engine is found TO BE SATISFACTORY. I received other goods IN PERFECT CONDITION.
Yours respectfully, ROGER S. PIERCE.

The "Electro"-Torch

This little torch is the most compact Blast Torch ever put on the market and has a power and capacity of a torch much larger in size. It it entirely automatic and works WITHOUT AIR PRESSURE and is started simply by putting a match to the wick. This torch gives a flame about 2 inches long as soon as the torch is lit up. The heat of this flame is sufficient to melt any of the soft metals for soldering purposes, to heat soldering irons and similar work. The torch is very small and compact and will fit in the hand. It has no cocks or valves to get out of order. It burns 2 hours on one filling. Alcohol should preferably be used.

Used by electricians, dentists, physicians, plumbers, gas fitters, telegraph and telephone linemen, painters, jewelers, schools, LABORATORIES, automobile and motor cycle repair men, power boats, and should be in the repair kit of every well appointed electrician.

For experimental work nothing will exceed this torch. There is positively nothing to get out of order and it will last for years. NO REPAIR SHOP IS COMPLETE WITHOUT THIS TORCH. Size 3 in. x 3 in. x ¾ in.

No. 3001 "Electro"-Torch., complete ..... .50c

1144

SOLDERING OUTFIT.

Contains soldering iron, scraper and large bar of finest solder, one box soldering salts, and full directions; all enclosed in handsomely finished box.

No. **1144** Soldering Outfit 15c
No. **1144a** Larger and more elaborate outfit 25c

BURNLEY SOLDERING PASTE.

This paste is something entirely new, and will surprise people who have to do much soldering. Takes the place of the ill-smelling acids generally used. It is used as follows: Apply small quantity of paste to parts to be soldered together, pass your tinned soldering iron over joint and you will be astonished to find a perfect, unbreakable connection which cannot be obtained by any other means.

No. 1145. Soldering Paste 15c

Boston, Mass.

Dears Sirs:

Received coil in GOOD SHAPE and am VERY MUCH PLEASED WITH IT.

Yours truly,

ARLAND R. CROPOL.

The Only Guaranteed

ALUMINUM SOLDER

In The World.

ALUMUNITE

Guarantee.—Money refunded if it does not solder aluminum to aluminum or aluminum to other metals in a strong and satisfactory manner, if applied according to directions.

Our new solder does not turn black or fall away after a short period, as other imperfect aluminum "solder's" do.

Directions.—Rub solder well into the aluminum, which must be scraped absolutely clean before applying solder. Solder must be well heated and must flow easy. Parts to be united must be thoroughly heated which is best done by using our "Baby" gasolene torch to supply heat, and a small soldering copper which must be clean or new to spread the solder. Do not use any flux, or acids. If aluminum is to be united with another metal, use flux on the other metal only. When cooled you will have a joint that will not come apart.

No. 8008 "Alumunite" Solder per stick.....$0 20

Box holding 4 long bars (equal to 16 sticks)..... 2 00

Eastman Kodak Co., Rochester, N. Y., says:—
"It serves its purpose admirably."

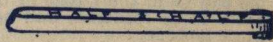
NO. 6345 WIRE SOLDER. The best grade of wire solder suitable for general mechanical and electrical purposes. Comes only in one pound bundles. Not less than ½ lb. sold.

Price per lb. **40c.**

6345

No. 6326 BAR SOLDER. The best grade of bar solder suitable for electrical and mechanical purposes. This solder is strictly half and half. Not less than 1 lb. sold.

Price per lb. 30c.



6326

FRICTION INSULATING TAPE. We carry a high grade black Tape known throughout the country. Quality of this tape is guaranteed. WE DO NOT CARRY THE CHEAP WORTHLESS KIND.

No. 6481 ½ lb. Roll $0.22

6481

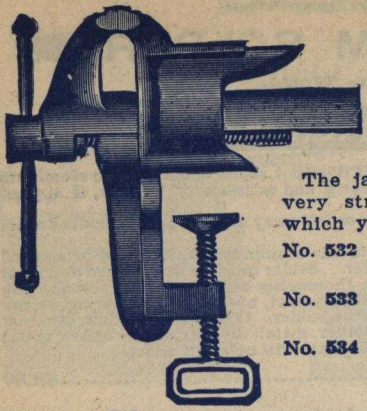
Baltimore, Md.

Dear Sirs:

My order, has been received. YOUR ALUMINUM SOLDER IS GREAT FOR SOLDERING WIRELESS AERIALS, and I can recommend it to any one.

Yours truly,
EDWARD B. DUVALL, JR.

VISES



Our little Vises, which can be clamped to any table, will come as a relief to many who do much experimenting. For filing, sawing, drilling, etc., a vise is always needed, and ours, the acme of perfection, cannot be surpassed.

The jaws are accurate, worm screw, very strong and durable. A vise on which you can depend.

No. 532 Steel vise, as described, jaws 1½, each.....$0.30

No. 533 Steel vise, as described, jaws 2¾, each..... .60

No. 534 Steel vise, as described, jaws 3½, each..... 1.10

SOLDERALL

1146

SOLDERALL is a wonderfull new solder and non-corrosive flux combined, in paste form, and contained in a collapsible tube, always ready for instant use.

No acids, rosin or flux necessary. All you have to do is to unscrew the cap from the nozzle of the tube, squeeze a little SOLDERALL on the parts to be soldered, and heat with a match, hot iron or torch, and the work is done.

Large holes can be soldered (something never before accomplished by other solders) by building a pyramid of SOLDERALL over the hole, and then applying a match or torch at short intervals, so as to melt slowly.

Indispensible in the Home, Shop, Garage, Laboratories, for repairing Kitchen Utensils, Toys, Leaky Pipes, Tin Roofs, Automobile Parts, Instruments, Models, Etc., Etc.

Will be found of the greatest use by Electricians, Telegraph and Telephone Linemen, Plumbers, Gas Fitters, Automobilists, Motor Cyclists, Dentists, Physicians, Jewelers, Engineers, Campers and Sportsmen.

Size of tube ¾"x3¼"

No. 1146 SOLDERALL, per tube.....$0.25

Ithaca, N. Y.

Dear Sirs:

I have received the coil and the tube of "Solderal" from you; both of which COME UP TO MY EXPECTATION.

Yours respectfully,

R T. DAVENPORT.

How to Figure Parcel Post Rates for the Goods in Our Catalogue

The following list contains the shipping weights of all articles in our catalogue. If we do not give the weight of an article, this means that the information concerning this item will be found on the corresponding page in the catalogue.

To find the amount of postage necessary to pay on our goods, look up the catalogue number of the article and consult the following list, which gives the exact weight. Having this weight, all you have to do is to look up the rate given in the enclosed Patented Parcel Post Computer. This gives the zone in which your town is located and the rate to pay. This makes it very simple for you to send us the correct amount of money which is required for the transportation charges.

For instance, our 1 inch Bull Dog coil No. 1088, page 75, weighs six pounds, therefore, if your town is in the first zone the Parcel Post rate would be $0.20; if your town is in the third zone the rate would be $0.32.

The weights given in the following list are the exact shipping weights; this means the apparatus or article packed and boxed ready for shipment. In some instances, as for glassware, etc., it is easily understood that the wrapping must be heavy so as to insure the safe arrival of the goods. In other instances a paper wrapping only is needed with some excelsior, which amounts to fractions of an ounce.

If you send in an order calling for different items of our goods all to be packed and shipped together, in one package or box, it is understood that you will benefit a good deal on the transportation charges, as it will not take much more packing material for one Geissler tube, etc., than for three or four. The saving which we can effect in all these cases is to your advantage as **we will return to you in every case the over-payment of your transportation charges,** if there is any.

Note.—Be very careful in figuring out the transportation charges for goods weighing, for instance, four ounces. If you order two items calling for four ounces each, this would make eight ounces shipping weight, but in reality you are required to pay for one pound, as the Parcel Post law states that articles which exceed four ounces up to 16 ounces must be mailed as a full pound. The same holds true if one article weighs one pound and another four pounds and six ounces. This means that you would have to send in money enough to cover six pounds at the Parcel Post rate. Some articles in our catalogue, as for instance wire, etc., which are sold by the pound, are always to be figured **PLUS** the packing material. Thus, if you order one pound of enameled wire, it is necessary to send in postage enough to cover **TWO** pounds at the Parcel Post rate. If you order four pounds of wire send in sufficient postage to cover **FIVE** pounds, and so on.

INSURANCE ON PACKAGES.

Always considering the advantage of our customers, **we have put in service a new system of insuring the goods sent by Parcel Post, and instead of having you pay 10c insurance fee we insure your goods at the following rate,** covering the loss from all perils, fire, breakage, including lamps and glass ware, and theft from time of deposit in the Post Office for mailing, to delivery into your hands at any Post Office within the United States, Canal Zone, Hawaii, Philippine Islands, Porto Rico, Alaska, Canada, the United Kingdom and Germany. **We insure $10.00 worth for 3c, $25.00 worth for 5c, and $50.00 worth for 10c. Just send us this money with your order and we will insure your parcel for the amount specified above. Do not fail to state that you wish the package insured.**

(over)

SHIPPING WEIGHTS

Page	No.	Weight Lbs.	Oz.
8	9002	..	12
8	1777	..	4
10	9235	..	12
10	7777	..	10
10	7778	..	2
11	8200	2	..
12	9500	2	..
13	1305	1	14
13	1306	1	5
13	1307	..	9
13	1308	1	..
13	1024a	..	8
14	6666	1	12
14	6667	..	8
15	8070	1	9
15	8071	..	10
15	8072	..	10
15	8073	..	5
15	8074	..	2
15	8075	..	4
15	8090	1	9
16	10010	..	4
16	10000	1	..
18	8486a	6	..
18	8487	1	..
20	12002	5	..
21	9950	1	14
22	3500	7	..
23	9240	3	5
23	9241	4	5
25	9250	1	..
26	9255	..	12
26	9220	..	8
27	9220a	..	10
27	8100	4	..
30	8000	6	..
30	8000a	..	4
30	8000b	1	..
30	8000c	4	..
30	8001	1	8
30	8002	..	3
30	8003	..	8
30	8004	..	3
30	9225	2	8
32	8050	12	..
32	8060	13	..
32	8080	3	..
32	8082	1	8
32	8081	1	4
32	8083	..	5
32	8084	..	8
32	1718	7	..
33	8271	6	8
35	9600	15	..
(Can go by P. P. in two packages.)			
36	1616	6	..
36	1617	7	..
36 Per lb.	4004	1	4
36 Per lb.	6066	1	4

Page	No.	Weight Lbs.	Oz.
36	9100	2	..
38	9270	1	8
39	9260	2	..
39	9261	1	..
39	9262	..	4
40	9221	1	12
40	9222	1	14
40	9223	3	12
40	9224	4	8
40	4225	..	4
40	9308	..	3
40	9209	..	3
40	9210	..	3
41	530	40	..
41	531	45	..
42	10007	8	..
Above per 8 pieces			
42	Doz. 1166	10	..
42	Doz. 9461	5	..
42	Each. 10341	1	2
Per Doz. 14 lb.			
42	Each. 10002	1	8
43	100 ft. 2509	1	13
43	100 ft. 2510	1	..
43	10001	8	..
Above per 8 pieces			
43	100 ft. 1526	4	..
44	9219	1	4
44	526	1	8
44	527	1	4
44	528	1	4
45	9280	20	..
45	9281	30	..
45	9282	40	..
45	1118 & 1119	..	5
46	1117	2	..
46	9212	2	4
46	9213 & 9214	..	4
47	10 ft. 1297	..	6
47	10 ft. 1298	..	8
47	10003	..	4
48	2502 & 2503	..	4
48	2504	..	2
48	2505	..	2
48	2506	..	2
49	1111	..	10
50	1097	1	4
50	1294	1	..
50	1295	2	..
51	5785	2	..
51	5786	..	4
52	2222	..	4
52	2222a	..	4
52	1296	..	2
53	1107	1	..
53	1108	1	..
53	1109	1	..
54	1299	3	..
54	1300	3	..
54	1301	3	..

Page	No.	Weight Lbs.	Oz.
54	1302	3	..
54	1303	7	..
54	1304	7	..
54	4335	1	2
56	RO25	5	..
56	RO25a	9	..
57	RO50	9	..
57	RO50a	20	..
57	RO100a	30	..
58	RO100	28	..
58	RO1000	30	..
58	RO2000	50	..
59	SO¼	15	..
60	SO½	20	..
60	SO1	28	..
60	SO5	28	..
61	SO8	35	..
61	SO10	40	..
61	SO15	50	..
62	SO20	70	..
62	SO50	80	..
63	SO100	85	..
63	SO200	120	..
64	1500/1503	4	..
66	1600/1602	30	..
67	1100	30	..
75	4360	4	..
75	1087	4	..
75	1088	6	..
75	4366	7	..
75	1	1	8
75	2	..	6
75	3	..	12
75	4	..	6
75	5	..	6
75	6	3	2
75	11	1	8
75	22	..	6
75	33	1	..
75	44	..	10
75	55	..	8
75	66	4	..
76	111	1	12
76	222	..	6
76	333	1	..
76	444	1	..
76	555	..	10
76	666	5	..
76	112	1	12
76	113	..	6
76	114	1	..
76	115	1	..
76	116	..	10
76	117	5	..
77	990	2	8
77	1001	2	8
77 Doz.	6323	..	4
78	10050	8	..
78 Ch'ge	10050	5	..
78	10060	10	..

Page		No.	Weight Lbs.	Oz.
78	Ch'ge	10060	6	..
78		10070	12	..
78	Ch'ge	10070	9	..
81		1251	7	..
81		1251a	3	..
81		1251b	1	8
81		1252	5	..
81		1252a	2	..
81		1252b	1	..
81		518	..	4
82		555	45	..
82		556	35	..
83		55	10	..
84		12500	30	..
84		12501	5	..
84		12502	..	4
84		12503	..	4
84		12504	2	8
84		535	..	4
84		536	..	4
84		537	..	7
84		538	..	10
84		539	..	14
84		539a	1	12
86		9000	6	..
86		9010	2	..
87		9050	..	10
87		9051	1	..
87		9051a	1	10
87		9052	..	8
87		9052a	1	2
87		9053	..	10
87		9053a	1	4
87		9054	..	3
87		9054a	..	3
87		9055	..	4
87		9055a	..	14
87		9056	..	4
87		9056a	..	14
87		9057	..	10
87		9057a	1	4
87		9058	..	7
87		9058a	1	1
87		9059	..	10
87		9059a	1	4
87		9060	..	2
87		9061	..	3
88		7007	..	12
88		7010	..	12
88		7047	..	12
88		7098	1	..
88		6779	..	4
89		1121a	..	4
89		1121	..	4
89		1125a	..	4
89		1122	..	8
89		1123	..	8
89		1124	..	12
89		1125	..	8
89		1126	..	8
89		1127	..	12
89		1128	..	12
90		9010	2	..
90		1129	2	..
90		1130	3	..
90		1131	2	..
91		1284	..	8
91		1132	6	..
92		1292	45	..
94		1	35	..
94		4600	35	..
94		4610	60	..
94		4620	45	..
94		4630	6	..
95		2	130	..
95		3	170	..
95		4	85	..
95		5	185	..
98		7001	25	..
101		7000	11	..
102		4400	7	..
102		7500	6	..
102		7501	..	4
102		7502	..	12
102		7503	2	8
103		4301/2	..	8
104		1037, 1042	..	8
105		7590	..	4
105		7199	..	6
105		5008	..	3
105		10420a	..	4
106		1054/55, 3437	..	8
106		4000	..	2
106		1043	..	2
106		1056	..	6
107		4710	..	6
107		1535	..	3
107		821	..	5
107		3418	..	6
107		5008	..	3
107		10420	..	4
107		6780	..	12
107		5018	..	3
107		929	..	8
108		1057 & 2057	..	14
108		1058	..	10
108		1043	..	2
109		5566	4	12
109		1062	1	..
109		1063	1	..
110		541	1	8
110		1056	..	6
110		1919/20	..	4
		Above per ½ doz.		
111		B1, B2, B7,		
		B8, B24,		
		B25, B26,		
		B27, B31	..	3
		Above per pair.		
111		B5, B6,		
		B10, B28,		
		B29, B30	..	2
		Above per pair.		
112		Per pr. B22	..	3
112		B3, B4, B9,		
		B11, B12,		
		B13, B14,		
		162, 6223,		
		6225	..	2
		Above per pair.		
112		Doz. 1908	..	8
113		Doz. 1915	..	4
113		Doz. 1909	..	12
113		6240	..	4
113		918	..	4
113		919	..	2
114		720, 945,		
		6964, 809,		
		507, 911,		
		908, 508	1	..
		Above per doz.		
115		6825	..	3
115		9900	..	4
115		9901	..	1
116		1052, 1053	..	2
116		3721	..	4
116		516	..	4
117		10004	..	7
117		10005	..	1
117		1276	..	6
117		419, 421	..	4
118		501 503	..	4
118		502, 504	..	8
118		505	..	6
119		560, 507,		
		514, 515	..	4
119		508, 513	..	2
120		1043, 1043a	..	4
		Above per doz.		
120		1044, 1045,		
		1046, 1048,		
		1049, 1050,		
		1051 Each	..	3
121		1272	..	2
121		1350	..	4
121		1350a	..	10
121		1700	10	..
121	Ea.	4000a	..	2
122	Ea.	4000	..	2
		(Per doz. 4 oz.)		
122	Ea.	4001, 4002	..	4
		(Per doz. 12 oz.)		
123		5000	..	7
124		517	..	4
124		1067	..	2
125		3777	2	4
126		1777	4	8
126		5777	4	..
126		2777	5	8
127		1024	..	7
127		1024a	..	8
127		1030	..	10
128		1114, 1115	2	..
128		165, 614	16	..
129		810	12	..
130		1331	6	8

Page		Weight No.	Lbs.	Oz.
131		1320	4	..
131		9201	4	..
131		9202	12	..
131		9203	10	..
131		9116	..	4
132		1880	1	..
132		1881	1	..
133		100	..	16
133		179	3	8
134		3000	1	..
134		3003	..	14
134		3010	..	12
134		1325	..	4
135		951/52	..	12
135		953	..	14
135		954	..	6
135		1000	4	..
135	Same without battery		2	..
136		955	..	6
136		965	..	4
136		950	..	4
137		1020, 1021,		
		1022, 1027	..	1
		Above per		yd.
137		1023, 1028	..	2
		Above per		yd.
137		169, 170	..	4
138		221, 166,		
		232, 168,		
		234, 174	..	3
138		1008, 1013	..	2
139		4285, 1014,		
		1015, 1016,		
		1335, 1336,		
		1337, 1286	..	3
140		1882, 178	..	2
140		9204	2	4
140		9204a	4	8
141		1310/11	..	6
141		1312	..	10
141		1313	..	14
141		1	..	3
141		5	..	4
142	For each ¼, ½ and			
143	¾ lb., the Postage is 1 lb. For each lb. the postage must be 2 lb. on account of packing material.			
144		1493	4	8
144		1492	6	..
144		1954	..	5
144		1495	..	3
144		1496	..	8
144		1949	..	3
152	Sq. yd.	6983	..	11
152	Sq. yd.	6470	..	8
152	Sq. yd.	6471	..	8
152	Sq. yd.	6472	..	7
152	Sq. yd.	6473	..	7

Page		Weight No.	Lbs.	Oz.
153	Empire paper		..	7
	Above per		sq.	yd.
153	4335,	6251,		
		6252	1	2
	Above per		ea.	lb.
153	6 Sheets	61	..	10
153	6 Sheets	92	..	6
153	6 Sheets	014	..	5
154		6984	1	4
154		6405	2	..
154		6701/02	2	8
154		6134	..	2
	Above per		10	ft.
154	Brass Wire		1	..
	Above per		Spool.	
155	Copper Wire		2	..
	Above per		Spool.	
155	30	Piano Wire	..	3
	26		..	3
	22		..	5
	20		..	6
	16		..	11
	Per spool of		25	ft.
156	1278, 1279,			
	1280, 1281,			
	1282 Per ft.		..	2
156		4313/14	..	2
156	8002, 8005,			
	8006,	7008	..	6
		Above per		ft.
156	Per ft.	8007	..	10
156		6272	..	2
157		6373	..	4
157		6373a	..	2
157	6274,	6275	..	3
157	6276,	6279,		
		6280	..	4
157	6277,	6281	..	5
157	6278,	6282	..	6
157		6283	..	8
157	Per pr.	6271	..	4
158	6042,	6045	..	2
158		6046	..	3
158	Per ft.	6047	..	6
158	6048,	6050,		
	6051		..	2
158		6052	..	3
159	Per ft.	6145	..	5
159	Per ft.	6146	..	7
159	Per ft.	6147	..	10
159	Per ft.	6148	..	14
159	Per lb.	529	1	4
160	6036,	6038	..	2
160		6080	1	..
160		6035	..	14
160		6082	..	3
161		6085	..	2
161	8075,	1309	..	3
161	6666,	4003	..	2
161		6083	..	1
161		6086	..	8
161		6087	..	7

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161		6088	..	6
161		6019	..	4
162	½ doz.	2521	..	4
162	½ doz.	3533	..	4
162	½ doz.	2530	..	4
162	½ doz.	6138	..	5
162	½ doz.	6112	..	4
162	½ doz.	6114	..	3
162	Doz.	6227	..	2
163	Doz.	6226	..	2
163	Doz.	6225	..	2
163	Doz.	6384	..	3
163	Doz.	6385	..	6
163	Doz.	6386	..	9
163	Doz.	6387	..	12
163	Doz.	6388	1	..
163	01107,	01109	..	3
164	Stick.	9211	..	4
164	¼ oz.	9211	..	2
164		9496	..	2
164	7700,	7701	..	3
	Per ½	dozen		sheets.
164	7702,	7703	..	4
	Per ½	dozen		sheets.
164		7704	..	6
	Per ½	dozen		sheets.
164		7705	..	8
	Per ½	dozen		sheets.
164		7706	..	9
	Per ½	dozen		sheets.
164		7707	..	10
	Per ½	dozen		sheets.
164		7708	..	12
	Per ½	dozen		sheets.
165	Doz.	6143	..	4
165	Ea.	6129	..	4
165	Ea.	6021	..	6
165	Doz.	6112	..	3
165	Doz.	6114	..	4
166	Doz.	6020	..	2
166	6700,	6701	..	12
	Above per		doz.	
166	Ea.	6702	..	2
166	Ea.	6703	..	3
166	Ea.	6704	..	4
166		6481/82	..	2
166	6501,	6505	..	2
	Above per		doz.	
166	Doz.	6506	..	4
166	Doz.	6507	..	6
167	⅛" Brass Ball			
Above	per doz.		..	2
167	3/16, ¼	do	..	3
	Above per		doz.	
167	⅜,	do	..	8
	Above per		doz.	
167	½,	do	..	10
	Above per		doz.	
167	⅝,	do	1	..
	Above per		doz.	
167	Ea. ¾,	do	..	3

Page		Weight No. Lbs. Oz.
167	Ea. 7/8, do ..	4
167	Ea. 1", do ..	5
167	Ea. 1¼, do ..	8
167	Ea. 1½, do ..	12
167	Machine Screws 6/32, 8/32, 1¼" to 1" Per doz. ..	3
167	Machine Screws 6/32, 8/32, 1¼" to 4" Per doz. ..	4
167	Doz.. 6032 ..	2
168	6963, 6014 ..	2
	Above ea.	
168	7779 ..	4
168	7780 ..	3
168	6017 ..	4
169	6024 ..	3
169	6027 ..	2
169	6013 ..	3
169	6011 ..	2
169	Doz. 5555 ..	4
169	Per ft. 6031 ..	3
169	Ea. 5025 ..	2
169	Brass Nuts 6/32, 8/32 ..	3
	Above per doz.	
170	Ea. 6015 ..	2
170	Doz. 6030 ..	2
170	Bamboo Strip ..	3
	Above ea.	
170	Bamboo Rod 3 sizes, 8 ft. long Ea. 2 ..	
170	6613 ..	3
170	1339 ..	8

Page		Weight No. Lbs. Oz.
171	6500	4 ..
171	1352	.. 4
172	60	.. 6
172	12	.. 7
173	35	1 4
173	41	1 9
174	6790	.. 4
174	6793	.. 4
174	6794	.. 4
174	6791	.. 5
174	6792	.. 8
174	6795	.. 6
174	6796	.. 9
174	206, 5"	.. 6
174	206, 6"	.. 9
175	452	.. 6
175	871	.. 6
175	1464	.. 10
175	1470	1 4
175	1471	1 8
176	6221	1 8
176	6231	1 4
176	6232	.. 2
176	6006	.. 9
177	6191-6197	.. 2
	Above ea.	
177	6088	.. 5
177	6086	.. 10
177	6950	.. 8
177	6951	.. 12
178	6029	30 ..
178	6016	30 ..
178	6021	3 ..
179	6161-6164	.. 3
179	6165-6166	.. 4
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179	6154-6157 ..	3
180	6170-6176 ..	3
180	6177-6189 ..	2
180	6422-6428 ..	4
180	6007 ..	4
181	1227 ..	4
181	1288 ..	5
181	6022	9 ..
181	6023	10 ..
181	6949	1 8
181	6981	1 ..
182	6513 ..	4
182	6009 ..	4
182	6286 ..	4
182	6135 ..	14
182	6982	1 ..
182	6041 ..	2
183	6026 ..	6
183	6220 ..	3
183	6224 ..	3
183	6021 ..	3
183	6983 ..	3
183	3333 ..	3
183	3334	1 4
184	3001 ..	4
184	1144 ..	7
184	1144a ..	10
184	1145 ..	4
185	8008 ..	3
185	Per lb. 6345	1 4
185	Per lb. 6326	1 4
185	6481 ..	10
	Above per ½ lb. roll.	
186	532	2 ..
186	533	3 ..
186	534	4 ..
186	1146 ..	4

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